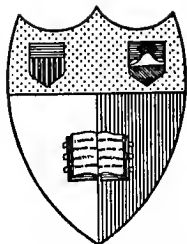




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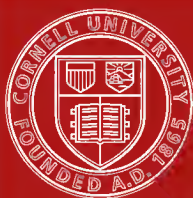
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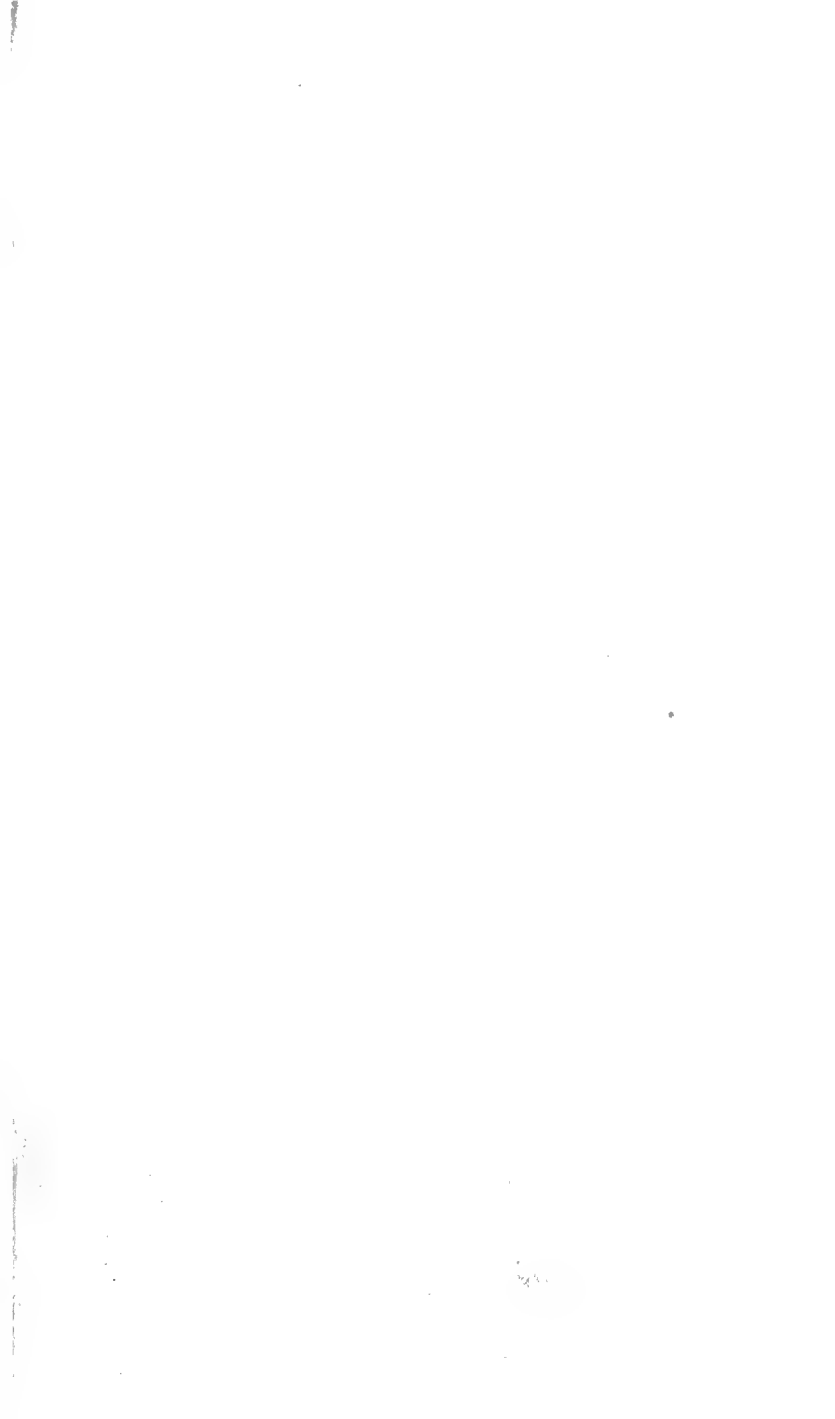
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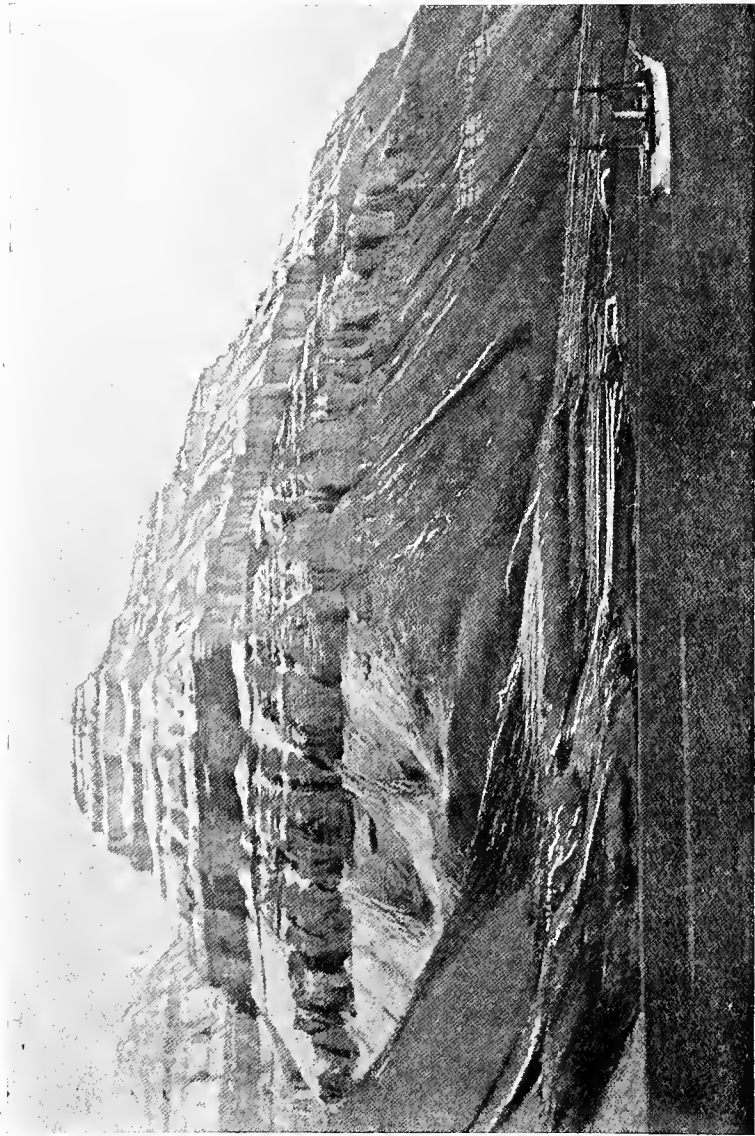


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TEMPLE MOUNTAIN FROM BONA HAVEN.

The Prince of Monaco's Yacht, the *Princess Alice*, at anchor. One of the most important British estates in Spitsbergen is situated here.

SPITSBERGEN

AN ACCOUNT OF EXPLORATION, HUNTING,
THE MINERAL RICHES & FUTURE
POTENTIALITIES OF AN
ARCTIC ARCHIPELAGO

BY

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1902-4; SCOTTISH ARCTIC EXPEDITIONS, 1909, 1912, AND 1919.
MEDALLIST ROYAL SCOTTISH GEOGRAPHICAL SOCIETY; AWARDED
THE CUTBERT PEEK GRANT BY THE ROYAL GEOGRAPHICAL
SOCIETY FOR EXPLORATION IN THE ANTARCTIC AND SPITSBERGEN

WITH MANY ILLUSTRATIONS AND THREE MAPS

LONDON
SEELEY, SERVICE & CO. LIMITED
38 GREAT RUSSELL STREET

1920

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TO THE MEMORY
OF
ALASDAIR GEDDES
SCOTTISH ARCTIC EXPEDITION, 1909
KILLED IN ACTION, APRIL 19, 1917

PREFACE

AFTER several centuries, during which it has been of interest only to explorers, Spitsbergen is again attracting a measure of the public interest which it drew in the years immediately after its discovery. This volume is an attempt to trace the history, exploration and economic development of the country and to give some account of the resources which are now attracting attention. It is impossible within the compass of one volume to describe or even to mention all the small expeditions which have visited Spitsbergen, but it is hoped that no expedition of importance has been overlooked. No attempt has been made to give more than a sketch of the physical geography, scenery and natural history of the country : to do justice to these a separate volume would be required. For the early history of Spitsbergen I have drawn freely on Sir Martin Conway's researches published in his *No Man's Land* in 1906, and his volume on Spitsbergen voyages published by the Hakluyt Society in 1902. The only other general volume on Spitsbergen that has so far appeared, apart from records of particular expeditions, is Gunnar Holmsen's *Spitsbergens Natur og*

Historie (1911). The story of modern Spitsbergen has been gathered from scattered sources in the scientific and other publications of half a dozen countries, from conversation with many Spitsbergen travellers, and from my own visits to the country. Such a work prepared during scanty leisure in days of stress cannot be faultless, but it is hoped that no serious mistake has been allowed to pass.

History moves quickly in Spitsbergen in these days. This year promises to be one of the most important in the annals of the country. New mining claims are being made, estates are being extended, and some may change hands. A small army of prospectors has been at work and the land is being ransacked for mineral wealth. It is not too much to hope that a form of government will be devised as a by-product of the Peace Conference, even if another year must elapse before the old evil conditions of anarchy disappear. This volume can only claim to give a record of events up to the opening of the summer season of 1919: exigencies of printing and publishing will not allow later history to be recorded.

Those who know Spitsbergen—and only they have opinions of value—foresee a great future for it, provided only that a strong and equitable form of government is devised. Minerals of great value occur in large quantities; but exaggerated statements of unqualified prospectors have prompted the arm-chair experts to shake their heads. The Scottish pioneers of mining in Spitsbergen have suffered from the

home-bred scepticism which is always the lot of pioneers, but eventually their work will tell. Once a firm government is established over the land the only remaining difficulty will be to convince the people of this country that Spitsbergen, although nominally in the Arctic regions, lies at the door of Western Europe and offers no insuperable difficulties either in approach or in habitation.

Mining is not the only wealth of the country. Under wise restrictions the game will increase to its former abundance and provide valuable furs as well as food for the mining population. Fox farms will be started and will bring a rich return.

Even apart from its minerals and furs Spitsbergen has a great future : it is not merely a source of money making. The matchless scenery, invigorating climate, and scientific interest will attract travellers in increasing numbers. If our insular prejudices against new ideas and novel conditions disappear, the day is not distant when Spitsbergen will be a great holiday centre and health resort, in both respects far superior and more comfortably accessible than the Swiss Alps or the Italian Tyrol. It will be one of the great playgrounds of Europe where the jaded town-dweller can find rest and rejuvenescence in bracing air and absorbing interests. Then Spitsbergen will have come into its own.

My obligations are especially due to Dr. W. S. Bruce for much information and help, and the loan of most of the photographs ; to Sir Martin Conway

for his published works on Spitsbergen which have been invaluable to me ; and to the Royal Scottish Geographical Society for the use of the map showing the chief mining estates, which was originally prepared for the *Scottish Geographical Magazine*. My wife has helped me in classifying my notes and arranging the index.

R. N. RUDMOSE BROWN.

HAMPSTEAD, *June*, 1919.

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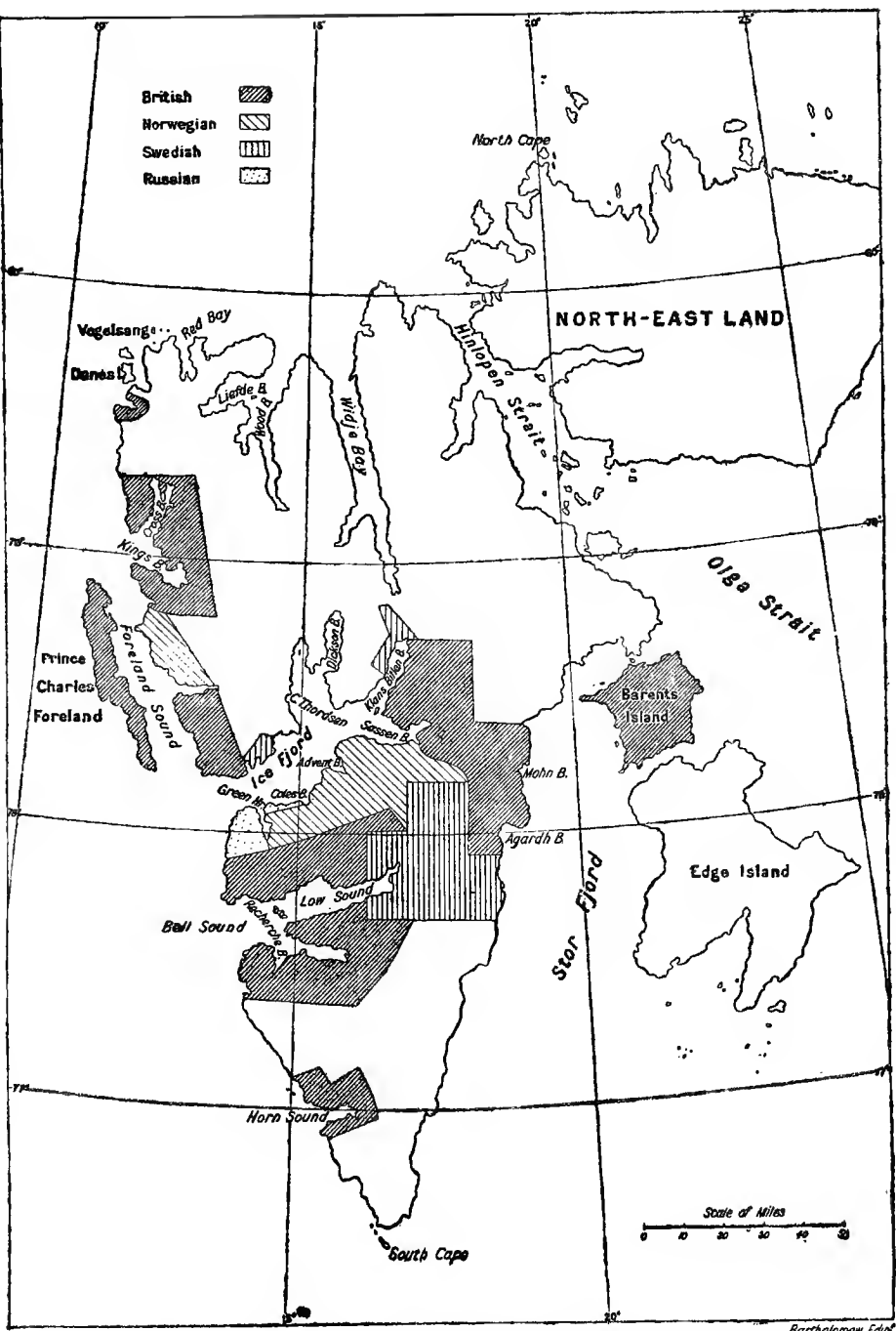
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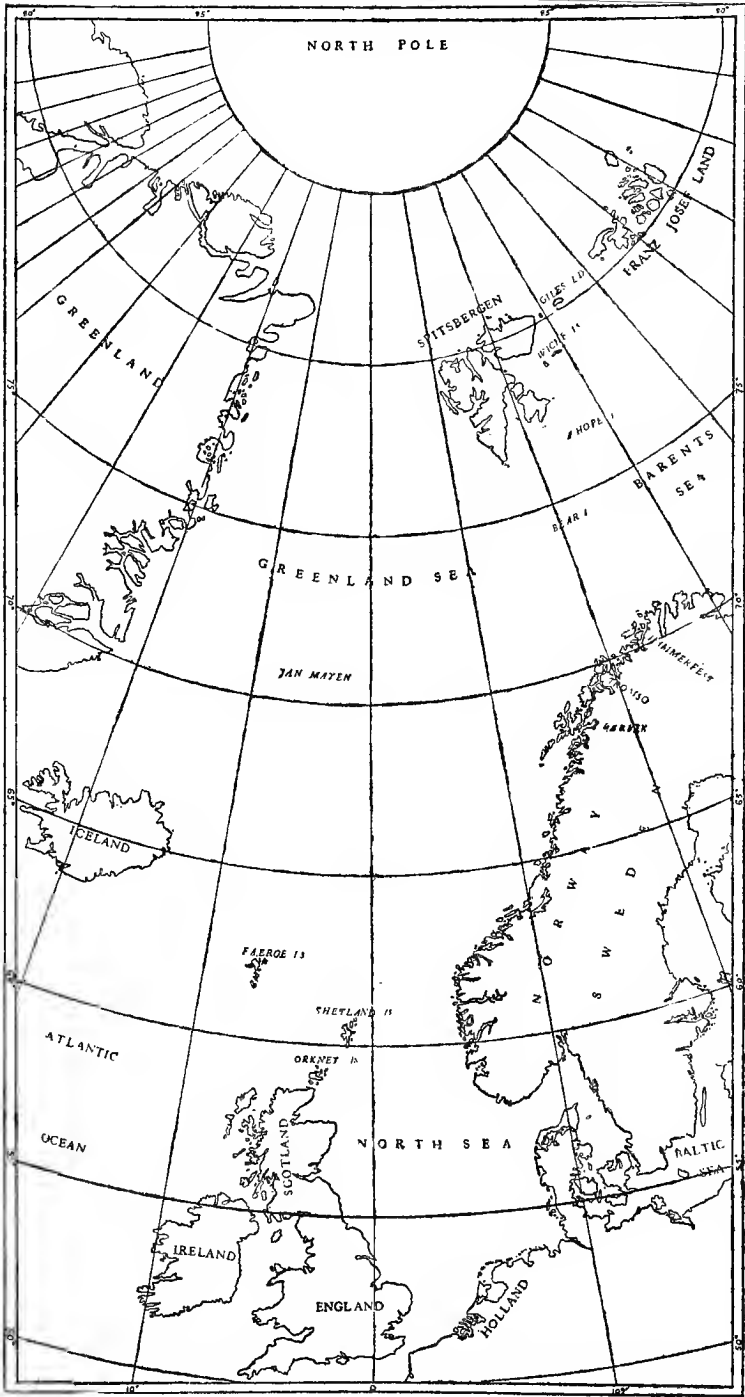
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Map showing the approximate boundaries of the principal mining estates in Spitsbergen, Spring, 1919. By permission of the Royal Scottish Geographical Society.



Map showing the relative geographical position of Spitsbergen.

SPITSBERGEN

I

THE DISCOVERY

THERE is some evidence that Spitsbergen was known seven centuries ago to the Vikings.

It is on record in the Icelandic annals, written in the fourteenth and fifteenth centuries, that in 1194 Svalbard was discovered. The annals are tantalizingly brief on the subject and contain only the bare statement. According to Dr. Fridtjof Nansen this record occurs in six different manuscripts, not one of which contains another word in explanation. In the *Landnamabok*, or Icelandic Book of Settlements, published early in the thirteenth century, Svalbard is referred to as a land which is known : “ from Langanes on the north side of Iceland it is four *doegr’s* sea to Svalbard on the north of *Hafsbotn*.” There has been much discussion as to what land Svalbard was : the east coast of Greenland, Jan Mayen, even the coasts of Siberia, as well as Spitsbergen have been suggested. It certainly was an Arctic land : Svalbard means the cold side, edge, or coast. To the Vikings, accustomed to bleak, in-

hospitable shores, the name could only be applicable to a snow-clad or ice-bound land. Hafsbotn or Trollabotn was the name the early Norsemen gave to the end of the ocean to the north of Norway and north-east of Greenland, roughly speaking the seas which are now known as the Barents and Greenland Seas. Svalbard lay somewhere to the north of that sea but not necessarily due north of Langanes, the north-east cape of Iceland, since the Landnamabok refers in all directions only to the chief points of the compass.

Due north of Langanes there is no land. In the paragraph in the Landnamabok from which the above quotation is taken, Greenland is mentioned separately as "one doegr's sail." There remain only the small island of Jan Mayen and Spitsbergen as possible identifications: the coasts of Siberia can safely be ruled out. According to Nansen a "doegr" was a day of twenty-four hours. Four doegrs' sail would therefore be the distance covered in ninety-six hours' continuous going, since there could be no anchoring at night in the open sea, while in those latitudes continuous daylight—the voyage was almost certainly made in summer—would favour uninterrupted progress. From Langanes to Jan Mayen is 288 nautical miles: from Langanes to Spitsbergen is 840 nautical miles. Apart from failing to satisfy the term "on the north of Hafsbotn," Jan Mayen is too near: one can hardly picture the Norse vessel making only 72 miles a day or an average speed of three knots. Nansen contends, not without reason, that an island of only 120 square miles would not

have been called Svalbard, a name suited only to the coast of a large country. To reach Spitsbergen in four days from Langanes a ship would need to sail at an average speed of nine knots. In a region of strong south-westerly winds a Viking ship could easily have maintained that speed. A replica of a Viking ship built for exhibition in America was sent across the Atlantic in 1893, and is said to have done nine and even ten knots a day in strong winds. If the ship reached Spitsbergen, pack-ice was probably found blocking the sea to the north, so that the term *Hafsbotn* was quite applicable. This would not be the case in the sea north of Jan Mayen, which would in all probability be open in summer. It seems reasonable to suppose that the Vikings were the discoverers of Spitsbergen, whether by intent to explore the northern seas or by the accident of a vessel blown out of her course. But there is no proof, and perhaps there never will be any, unless verification is forthcoming of the reported existence of a Viking ship in one of the lagoons of Prince Charles Foreland. If they discovered Spitsbergen they clearly thought little of it. Its possibilities as a hunting ground do not seem to have occurred to them, or the record of Svalbard's existence could not have been so completely forgotten that it remained for twentieth-century scholars to unearth it.

Long after Svalbard had passed into oblivion Spitsbergen was probably rediscovered by another people. Early in the sixteenth century, if not before, Russians from the White Sea and the Murman coast hunted walrus and seals in polar seas. It is said that even

before 1435 Novgorod emigrants to the White Sea coasts had huts in Spitsbergen on a bay called Starostin, subsequently changed to Klom Bay or Klok Bay, probably the modern Bell Sound. There is not the least doubt that Russians frequently visited Spitsbergen, including the bay in question, in the eighteenth century; but whether they went there three centuries earlier is doubtful, though not impossible. A descendant of one of these Novgorod peasants is said to have been the trapper Staratschin, who lived thirty-two years in Spitsbergen and died in 1826 near the cape which now bears his name at the entrance to Icefjord. At any rate there is fairly good evidence that in 1576 the Russians of the Murman coast knew of a northern land which was possibly Spitsbergen.

In that year the Danish King Frederick II sent a letter to a certain Ludvig Munk of Vardö, in the north of Norway, ordering him to make the acquaintance of a Russian pilot named Paul Nishets living at Mallues, in the Kola district, who sailed to Grumant, and was willing to guide Trondhjem vessels to that land. Grumant is difficult to identify. The word is said by Scandinavian philologists to be the same as Grönland or Greenland. Greenland in those days had a vague application: it was freely used as late as the eighteenth century to embrace Spitsbergen. If any other lands had been discovered in those seas they too would have been termed Greenland. Grumant probably did not mean the land now known as Greenland, which the Russians do not seem to have visited. It is possible that Grumant was *Novaya Zemlya*, but

it is equally possible that it was Spitsbergen. In modern times the Russians frequently use Grumant, as the Norwegians do Svalbard, to mean Spitsbergen.

Perhaps, as Nansen suggests, the Russian sealing and walrus hunting in polar seas was a continuation of the Norwegian sealing. Sealing is carried on at the edge of the pack, which must in many seasons have brought both Norwegians and Russians within sight of Spitsbergen. Sealers are notoriously secretive as to their favourite hunting grounds. This may explain why little information about Svalbard and Grumant was put on record and why the existence of these lands was eventually forgotten.

At the end of the sixteenth century the story of Spitsbergen emerged from the mists of uncertainty with the Dutch discovery in 1596. This, like so many of the great geographical discoveries, was a result of the quest for a new and quick route to the Spice Islands and the riches of Cathay. The hope of finding a passage independent of Portuguese control led Sir Hugh Willoughby and Richard Chancellor in 1553 to the White Sea and Novaya Zemlya. Purchas, in his famous account of the voyages and discoveries of the English nation, erroneously attributes to Willoughby the discovery of Spitsbergen. The English, unfortunately, had not this honour. The town of Amsterdam, anxious to try its fortunes in the search for the wealth of the East, equipped an expedition of two ships. It is recorded that the crews were as far as possible unmarried men, in the hope that they would show no anxiety to turn back and so injure the prospects of success. Strange to say, there is no

record of the names of the two ships, but one was in command of Jacob van Heemskerke Hendrickszoon, who in later years became Admiral in command of the Dutch fleet, and the other was in command of Jan Corneliszoon Rijp. Willem Barents, who had made two voyages in the two previous years to Novaya Zemlya and the Kara Sea with the same object in view, was chief pilot of the expedition, and it was by his advice that the ships took a northward course after clearing the latitude of northern Scandinavia. On Heemskerke's ship also sailed Gerrit de Veer, a former companion of Barents.

To de Veer we are indebted for the narrative of the expedition and for much of its success. For it appears that it was the persistence of de Veer that made Barents follow his original plan and not turn eastward in a lower latitude. The two ships left Texel on May 18, 1596. On June 9 they reached an island where the explorers landed and scaled a steep mountain. In memory of a great fight which they had with a polar bear, said to be twelve feet long, the Dutchmen named the island Beeren. This is the Bear Island of modern maps. At a later date it was renamed Cherrie Island by Poole, after Sir Richard Cherrie of the Muscovy Company, but this name has no call to be retained. Barents had a lucky landfall in making Bear Island. Warm and cold ocean currents meeting in its vicinity result in a thick mist which generally envelops the island and makes it invisible at a few hundred yards' distance. Nowadays vessels going to Spitsbergen prefer to give it a wide berth, for the compass works badly in the vicinity of

Bear Island and adds to the difficulty of navigation in the fog-infested sea.

Continuing their northward voyage the ships had some difficulty with pack-ice, which forced them to turn eastward in a high latitude. At length, on June 17, after a few days of uncertainty they sighted to south-south-west, a high land covered with snow. This was the north coast of Spitsbergen, at a point between Hakluyts Headland and the entrance to Liefde Bay. The ships followed the coast, and discovered Red Bay and the Norway Islands, and anchored evidently between the rocks of Cloven Cliff and Vogelsang, in the place now called Fairhaven, not to be confused with the real Fairhaven further south. On one or other of these islands Barents set up a post bearing the Dutch arms. A week after the discovery of Spitsbergen the vessels left for the south, skirting the west coast. They visited Magdalena Bay (Teeth Bay), where they took possession in the name of Holland, tried unsuccessfully to pass the bar in Foreland Sound, which they called Keerwyck, crossed the mouth of Icefjord (Grooten Inwyck) and entered Bell Sound or Inwyck as de Veer called it. On July 1 they were back at Bear Island. There Barents turned eastward to Novaya Zemlya, a land which he had known on previous voyages. Caught by the ice the Dutch explorers had to winter in about lat. 76° N., in a hut built of driftwood. The adventures of the first European winterers in Arctic regions does not concern us here. The next summer they made their way in open boats to Russian settlements on the mainland, but Barents, exhausted by scurvy, died

during the voyage, on June 20, 1597, almost exactly within a year of his great discovery.

Barents gave the country the name of Spitsbergen, from the appearance of the sharp-pointed mountains. The name is Dutch and should be spelt with an "s" in the middle. There is no excuse for adopting the German form, with a "z," which has crept into usage. A reversion to the original spelling has been adopted by all authorities, including the British Admiralty and Foreign Office, the Norwegian, Swedish, and other Governments. For long after its discovery by the Dutch Spitsbergen was looked upon as a part of Greenland. That curious error caused much confusion and led to a protracted dispute between Denmark and other Powers as to the sovereignty of Spitsbergen.

The Dutch discovery revealed only the west and part of the north coasts. There is no foundation for the story of certain historians that Barents visited the east coast on his way to Novaya Zemlya, or that Rijp circumnavigated the archipelago. Rijp on parting from Barents seems to have attempted to return to Fairhaven, in the hope of finding a way to the east. But he had no success, and the circumnavigation of Spitsbergen was not accomplished till nearly three centuries later, when in 1863 the Norwegian captain, Elling Carlsen of Hammerfest, sailing along the north coast of Spitsbergen, rounded North-East Land and returned southward via Giles Land, Barents Island, and Hope Island.

Spitsbergen attracted little attention at the time of its discovery. It was merely another obstacle on

the road to the East and its economic value was not recognized. The Dutch paid no further attention to it for many years. The early exploration was nearly all the work of English sailors. Henry Hudson, in the *Hopewell*, set out for the Arctic Seas in the spring of 1607, in the hope of finding the north-east passage. After visiting King's Bay he reached Vogel Hook, but his geographical work on this voyage was of little importance and added nothing to the discoveries of Barents. The Dutch still held the record for "furthest north," which they maintained for many years. But if Hudson found no new land, he made a discovery which was to have results of greater importance. His reports on the abundance of whales, seals, and walrus led to the foundation of the most important industry that Spitsbergen was to know for three centuries. The Dutch, strange to say, had missed this discovery, merely commenting on the abundance of Barnacle geese and their eggs. Hudson's report soon resulted in fleets of whalers—English, Dutch, Danish, Biscayan—setting sail for Spitsbergen every summer. The west coast, and particularly the north-west coast, became well known, though not accurately charted. Both the English and Dutch companies which dispatched the whalers were in the habit of assigning a certain number for discovery rather than commerce. Thus in 1614 two out of the fourteen Dutch and two out of the eleven English whalers had orders to push afield and explore. On the whole the English captains were more enterprising than others. Prominent among them were Jonas Poole, Robert Fotherby, Thomas Edge and Thomas Marmaduke.

The Dutch, while mainly confining their attention to commercial enterprise, in a few cases did some useful exploring work.

The names on the east and north of Spitsbergen bear testimony to the venturesome spirit of the early English whalers, as those on the north-west coast recall the Dutch discovery. Thomas Marmaduke, of Hull, showed much zeal as an explorer. He was in 1613 the discoverer of Hope Island, and from a high hill on Barents Island he sighted the great ice-clad North-East Land, or as he called it Sir Thomas Smith's Land. Probably he also saw the Wiche Islands, the discovery of which was due to Edge a few years later. These are the islands which the Swedes more than two centuries later called King Karl's Land, a name which in justice should be applied only to one of the islands. Giles Land was a Dutch discovery of nearly a century later which suffered from this Scandinavian habit of ignoring the work of early explorers in the zeal for names of Scandinavian choosing. The discoverer of the large island named after Edge is uncertain. Joris Carolus, a Dutch skipper of an enquiring turn of mind, certainly found it in 1614, but it may have been known earlier. Carolus called it Matsyn Island (written Marfyn in error), confusing it with Sir John Willoughby's discovery in Novaya Zemlya a few years earlier.

This error, Sir Martin Conway believes, may have led to the false claim of the Muscovy Company that Willoughby discovered Spitsbergen. Carolus, when he retired from the sea, wrote an account of his travels and discoveries. He claimed that as early as 1614 he

did not believe Spitsbergen to be a part of Greenland, giving as his reason the existence of a current from the north which proved that there was open sea between the two countries. But Carolus apparently made no converts to his theory. Within a few years, however, the English whalers seem to have satisfied themselves that Spitsbergen and Greenland have no connection with one another. As soon as the north coast of Spitsbergen became known this must have been evident. Yet for many years, more by custom than in bad faith, the country was spoken and written of as Greenland more frequently than Spitsbergen. The Danes, for reasons explained on another page were loth to destroy this illusion.

The outline of the chart of Spitsbergen is largely British work if we except the north-west coast. If the whalers had not kept their discoveries secret they could have produced fairly good charts early in the seventeenth century. All whalers and sealers are alike in this respect : to publish a discovery is to give something to a rival. New fishing grounds are kept private. The Muscovy Company no doubt had their own charts, or at least the material for charts, but so jealously were the secrets guarded that, according to Conway, only one of their surveys, one by Fotherby of part of the west coast, has come down to us. However, the map known as Edge's map, published in 1625, in *Purchas Pilgrims*, contained a great deal of matter collected by the Muscovy Company. On the whole it is a fairly good map as regards the west coast, the western part of the north coast and the south of Edge Island. In some respects it shows Prince

Charles Foreland more correctly than the Admiralty chart of 1901. The extraordinary mistake which Purchas made with regard to Wiches Land we will return to later. Edge's map represents the last important British contribution to Spitsbergen cartography until recent times. Thenceforth cartography failed to keep pace with the whaler's knowledge. Later improvements in the charts were due to Dutch cartographers. The best was one published about 1710 by Giles and Rep, which held its place until modern times and was even used by Sir Edward Parry in 1827.

II

PHYSICAL FEATURES AND CLIMATE

WHEN the Dutch called their discovery Spitsbergen they chose a thoroughly descriptive name. The first impression the country gives is one of sharp mountain peaks with intervening valleys filled with glaciers. The high nature of the land makes a good landfall, for it can be seen from afar. The whole country is mountainous, the hills rising steeply from near sea-level, leaving as a rule only narrow strips of plain along the coast. Steep and barren, the hills give the impression of considerable height, but in reality their general average is only some 3000–4000 feet, few of them being over 5000 feet. Hornsunds Tind, overlooking Horn Sound, rises to a height of 4690 feet and used to be considered the highest mountain in Spitsbergen: now it is known to be dwarfed by Mount Newton (5676 feet) and Mount Poincaré (5446 feet), both in the eastern part of the country known as New Friesland. Bear Island rises to a height of 1760 feet in Mount Misery.

The sharp-peaked mountains impress the traveller first, because Spitsbergen is generally approached from the west, but on the east coast and in the centre of the country the mountains are characteristically

30 PHYSICAL FEATURES & CLIMATE

flat and table-topped like the famous Temple Mountain, on the steep sides of which the screes give the impression of gigantic buttresses. These flat mountains rule throughout Spitsbergen, except on the west.

Spitsbergen is not a large country : its total area being only some 25,000 square miles, or roughly speaking about the size of Scotland. Bear Island is 70 square miles in area. The archipelago of Spitsbergen, for so it should really be termed, includes the large island known as West Spitsbergen, or more generally simply as Spitsbergen ; the large island in the north-east, across Hinlopen Strait, which has no better name than North-East Land ; the group of small islands on the east, separated by Olga Strait from the mainland and called the Wiche Islands ; the two large islands on the south-east, Barents and Edge Islands, cut off from the mainland by Storfjord or Wybe Jansz Water ; the outlying Hope Island ; and, on the west, the long, narrow island of Prince Charles Foreland. Bear Island, although 127 miles to the south-south-east, is generally included with Spitsbergen. In addition to the islands named there are scores of small islands, particularly on the north-west, north and east coasts.

The main island, or Spitsbergen proper, is deeply cut by long, branching fjords, some of which extend so far into the interior that they almost cut the country into islands. Adjoining fjords are often separated from one another by narrow isthmuses, which if they were low-lying, would be easily crossed. A depression of a few hundred feet would cut the island

into two. The largest fjord is Icefjord, which opens on the west coast and by its various branches, Green Harbour, Advent Bay, Sassen Bay, Klaas Billen Bay, and Northfjord, gives deep water access to the heart of the country. From end to end Icefjord is over fifty-five miles long, and since it cuts through the mineral-bearing rocks is the most important waterway in Spitsbergen. Other great fjords on the west coast are Horn Sound in the far south, Bell Sound a little further north, opening to Recherche Bay, a noble harbour, Van Keulen Bay, and Lowe Sound, and towards the north the twin fjords of King's Bay and Cross Bay. All these have been of great importance in every phase of Spitsbergen's economic development. In the north-west the smaller inlets of Smeerenburg Sound or Mauritius Bay, and the "gats" which link it with the ocean were of even more importance in the early days of whaling. The fjords opening on the north coast are not less remarkable than these on the west, but from their position have attracted less attention. Red Bay vies in beauty with Cross Bay or Sassen Bay, and Wijdefjord, which is over fifty miles long and is comparatively narrow, has several great branches. All the fjords provide scores of good, sheltered harbours.

The smaller islands are much less dissected than the mainland and several of them have no good harbours, but they are equally mountainous and rugged. Prince Charles Foreland has a long ridge in the middle rising to its greatest elevation in Mount Monaco, but the ridge is broken in the southern half by the most extensive plain in Spitsbergen. From

side to side of the island stretch the low, flat Foreland Laichs, with an area of over thirty-five square miles, rising nowhere to more than eighty feet above sea-level.

Only one sign of recent volcanic activity has been discovered in Spitsbergen. That is in Bock Bay, a small inlet of Wood Bay, which in its turn is a branch of Liefde Bay. There the Isachsen expedition in 1910 discovered an extinct volcano and eight hot springs. The volcano, which is 1650 feet high, dates from comparatively recent times, certainly after the Ice Age. The hot springs have a temperature of 75° to 82° F.; lying in a row they have formed a series of lime basins of considerable interest. All other lavas in Spitsbergen—and they are not numerous—seem to be of much older date.

A great many of the valleys are filled with glaciers, above which tower the bare mountain peaks; but the ice-covering is far from universal, and in fact far less continuous than used to be supposed. It is only in North-East Land, Giles Land, and parts of New Friesland that there is any land-ice which merits the name of inland ice in the sense that it is used in Greenland and Antarctica for a continuous sheet of ice flowing outwards in all directions and not enclosed by rocky borders. In other parts of Spitsbergen the land-ice takes the form of glaciers, large and small, and *névés*, or consolidated snowfields, which feed the glaciers. But one of the curious anomalies of the country for which no satisfactory explanation has been found is the unequal distribution of the glaciers. They are very numerous in the north-west in King James Land,



A GLACIER FACE IN BELL SOUND.

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where the Seven Glaciers flow to the sea between Cross Bay and South Gat, and the great Monaco Glacier empties into Liefde Bay. In the middle stretches of the west coast they are comparatively few and small, but in the south of the island they are large and numerous. Prince Charles Foreland, narrow as it is, has large glaciers on its eastern side towards Foreland Sound, but they are not continuous from north to south, and there are none on the west coast.

The heart of Spitsbergen is strangely free from glaciers. Large valleys like Adventdal, Sassendal, and de Geer Valley have rivers in their beds : Gips Valley, Dry Valley, and others, are open, but for glaciers at their extreme heads. On the other hand the Post Glacier at the head of Temple Bay fills the valley between the Temple Mountains and the Colorado Hills. On the east of the country, glaciers are very numerous, few valleys in Storfjord and Hinlopen Strait being free from ice. Barents Island has a few small glaciers, and Edge Island has several larger ones, but the Wiche Islands have little ice and Hope Island has none.

The greater rainfall and snowfall on the west coast than in the interior may have something to do with the unequal distribution of land-ice, but in itself is an insufficient explanation. Exceptions occur which cannot be explained on these grounds. Height alone seems to have little to do with the matter. Differences in the nature and stratification of the rocks may possibly have some effect, and the existence of gathering grounds for snow is of course of great importance.

One thing we can say with tolerable certainty is that glaciation to-day is less than it was in recent geological history. Time was when the great glaciers probably advanced to the mouths of the fjords, and perhaps only the highest peaks stood out as lonely nunataks above the surface of the ice-fields.

Some of the glaciers are still of considerable size. The great Crown Glacier is upwards of twenty miles in length, the Lilliehöök Glacier is over twelve miles long, and the Monaco Glacier in Liefde Bay fifteen miles.

There is some evidence that several of the glaciers are even now receding, but the recession may be intermittent: accurate observations do not cover a long enough period to allow this problem to be solved. Few of the glaciers extend into the sea, so that as a rule there is a narrow strip of beach, or in any case shallow water, along their faces at low tide. This is probably explained by their slow movement and possible recession. Their seaward ends break off in small blocks and fragments of ice: icebergs even of pigmy size are seldom born of Spitsbergen glaciers, except in the far north-east. The lower ends of many large glaciers are in a crumbling state: crevasses cross one another in all directions, producing a tumbled chaotic mass of ice-blocks. The Post Glacier is continually shedding ice-blocks into Temple Bay, the waters of which are generally dotted with floating ice. It is not of the size or frequency to hinder navigation, unless a hard block struck a ship's propeller, and it adds greatly to the beauty of the bay.

Higher up the glaciers are less crevassed and the *névés* between contiguous glaciers are relatively smooth though undulating. The remarkable surface of the ice-cap of North-East Land is described in a later chapter.

The nomenclature of Spitsbergen is in a state of great confusion. Many of the early English and Dutch names have become replaced often by corruptions of the original, often by later impositions. In some cases this was unavoidable because the old charts in places agree so badly with the real lie of the land that it is difficult to say to what feature the name was originally intended to apply. Corruptions of names and abbreviations of long titles are of course inevitable.

Sir Martin Conway has been at great pains to unravel the complexities of the nomenclature and has published a chart on which the names with claim to priority replace later substitutions. Dr. W. S. Bruce has taken care in his map of Prince Charles Foreland to omit no early name the location of which he could identify with certainty. No doubt old names should and can be revived, but in practice there are limits to the expediency of this course. No effort can replace Advent Bay by its original Adventure Sound or transfer to it the name of Klaas Billen, now firmly fixed to another part of Icefjord, any more than the original name of Grooten Inwyck can supplant Icefjord. Recherche Bay should never have replaced Schoonhoven, but now it must stand. Storfjord is a late Scandinavian introduction for the Dutch Wybe Jansz Water, but is becoming too well known to be

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removed. Even names that have become displaced, like Fairhaven and English Bay, must remain in their new places. The cumbrous name of Sir Thomas Smith's Island has no claim except priority over the nondescript title of North-East Land. A few names might suitably disappear : there was never much call for the term Zeppelin Harbour applied to an indentation of King's Bay, and this foul name should be erased.

Several corruptions are more descriptive than the true versions of the names. Coles Bay in Icefjord, where coal seams occur, is wrongly termed Coal Bay, and Heley Sound on the east coast, named after an English Vice-Admiral, was not inappropriately, by reason of its swift current, called Hell Sound by Lamont. A curious case is the point and the hill on the north of the entrance to Icefjord. Dödmanden, meaning dead men, has been corrupted to Deadman's Den, which appears on the map. Dödmandsören is the same name with a suffix meaning pebbly beaches : this has been corrupted to Deadmen's Ears.

In tracing the exploration of Spitsbergen we shall have occasion more than once to refer to these problems of nomenclature. Here we need only express the hope that further confusion will be avoided and that established names will not be ignored by future map-makers. The standard map for travellers to Spitsbergen is the British Admiralty Chart, which on the whole is a fairly safe guide to existing usage in nomenclature. It is to be hoped that the recent suggestion of certain ardent Norwegian nationalists to call Spitsbergen by the name

of Svalbard will meet the fate it deserves. It is a suggestion as impracticable and absurd as that of reviving the name of Oslo for the capital of Norway.

From a purely geographical point of view Spitsbergen is part of Europe, for it lies on the submarine shelf which extends from Europe northward till it alls away into the depths of the polar basin. At the same time, it is undoubtedly part of the Arctic regions and experiences at some times of the year an Arctic climate. Yet the rigour of the climate is much less than might be expected in a land that reaches to within 600 miles of the North Pole.

In the summer months of June, July and August the weather is often quite warm: it can be unpleasantly hot for heavy exertion. One can bask in the sunshine as pleasantly as in a Scottish countryside in July. Of course there are dull days and not infrequent gales, especially on the west coast, and thick mists lying low on the hilltops are of common occurrence. But even in the worst weather the air feels invigorating and conducive to effort. Rain does not fall very often and snow is rare in summer. By mid-September, autumn sets in with heavy gales, snowstorms, and increasing darkness, and in a few weeks' time winter is over the land.

Winter as a rule is a fine calm period, even if cold. Of course frost is practically continuous, the temperature falling as low as -49° F., although the coldest month in Green Harbour, February, has an average mean temperature of only -4.5° F. Snow in its dust-like Arctic form falls from time to time, but the actual falls are less unpleasant than the drifting in

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high winds. Darkness reigns for several months, but there is generally quite sufficient light for travelling, and displays of the aurora borealis are not infrequent.

With the growing daylight in May spring comes on apace, but in June the snow, though rapidly melting, is still on the ground.

The relatively open climate which Spitsbergen enjoys is due partly to the warm currents that wash its western shores, and partly to the south-westerly winds which frequently blow over the archipelago from lower latitudes. Argument will never cease as to whether this warm current is really the overworked Gulf Stream or only the warm surface waters of the Atlantic drifting north before the prevalent winds. It matters little what name it receives. Sweeping up the coast of Norway it sends one branch eastward along the Murman coast and another northward to Spitsbergen. This branch passes west of Bear Island and flows north, ten to twenty-five miles west of Prince Charles Foreland into the Arctic basin, with a branch eastward along the north coast of Spitsbergen. Its close approach to the coast in the north-west corner about Dane's Island largely accounts for that region looming as large as it does in the history of Spitsbergen.

While the west coast, and to a small extent the north coast, benefit from this warm current, the east coast suffers from a cold current flowing from the Arctic Ocean south and south-west into the Barents Sea, bringing with it low temperatures and floating pack-ice. Warm and cold currents meet in the

vicinity of Bear Island and lead to the thick mists which often envelop that dismal spot.

These currents explain the distribution of pack-ice around Spitsbergen. Most of it comes, as already mentioned, down the east coast, which is always blocked in winter, and rounds the South Cape, spreading as far south as Bear Island, which it frequently envelops. Then, caught in the northward setting current, it streams up the west coast, spreading out into the Greenland Sea and meeting the pack in the far north. A succession of north-easterly winds in summer generally results in the west coast of Spitsbergen being invested with pack-ice till late in July or August. There are even rare seasons in which streams of pack obstruct navigation in Icefjord in August, while Bell Sound is sometimes blocked in summer. On such occasions a vessel may be able to approach King's Bay round the northern end of the pack-ice, or it may be able to find an open channel between the main body of the pack and the land by standing close in to the South Cape and Horn Sound.

There are exceptional years in which the west coast is open or faced by only a few miles of pack, even in mid-winter, and probably in all years, September and October, and even November, are as open as the summer months for navigation, but the growing darkness is a great hindrance.

It often happens that a summer in which the west coast suffers from a good deal of pack, the east coast, and especially Storfjord, is relatively clear. Late summer certainly seems to be the best season for navigating the seas east of Spitsbergen.

In winter ice forms in all the fjords or the drifting pack which fills them congeals into solid floes. On the west coast the date of this occurrence varies considerably: open water may occur intermittently up till New Year or even later. The same is true of the north coast.

Another peculiar feature of Spitsbergen, which the currents explain, is the presence of driftwood on many of the shores. It is a common sight to see the beaches, especially on the west and north coasts, littered with tree trunks and smaller timber. Some of them are piled high with stacks of timber. In the raised beaches above the present tide limit trunks are found embedded in the soil in an excellent state of preservation. The presence of this timber in a country which lies far north of the limit of tree growth is a strange anomaly, but is easily explained. The great rivers of Siberia rushing down in spring floods to the Arctic Ocean, bear with them thousands of pines and larches torn from the banks. Caught in the transpolar current—the same that drifted Nansen's *Fram* across the Arctic Ocean—these logs in the course of time are thrown on the coasts of Spitsbergen by the current which washes down its northern and eastern shores.

The presence of the driftwood on the west coast is probably due to its being caught by the northerly drift as it rounds the South Cape. But the Atlantic drift adds its contributions, which reach even the north coast. Though worn and stript of bark, the trees suffer little on the journey: logs of fifty to sixty feet are often found. Among the driftwood there is a



IN THE HEART OF KING JAMES LAND.
View looking south-west from Ben Nevis to Grinnaldi Range and Grand Glacier.

certain amount of wreckage of Norwegian sloops and perhaps of Siberian river craft. Occasionally wooden implements of Samoyede origin come to light. Norwegian fishing floats of the kind used in the Lofoten Islands prove that all this flotsam is not from Siberia, and A. E. Nordenskjöld found among driftwood at Shoal Point on North-East Land the well-preserved bean of a West Indian plant of a kind not infrequently washed up on the coast of Norway.

III

ANIMALS AND PLANT LIFE

TO the naturalist Spitsbergen is a happy land in summer-time, even if growing population and excessive hunting have virtually exterminated some beasts and frightened others away. Here we can touch only lightly on these aspects of the country. The white polar bear used to be very common on the north and quite frequent on the west coast, but now he is seldom seen except on the east during winter. The polar bear is really a sea animal, keeping more or less to the pack-ice, where he can feed on seals. Pike recorded many bears on the Wiche Islands one open summer when ice had left them stranded there. It is only when the ice invests the west coast that bears are found there. When pressed by hunters and reduced to living on mosses and lichens, as occasionally happens, the bear is dangerous, but at other times he is more likely to be frightened of a man. It is a solitary animal as a rule, wandering aimlessly except when in search of food. In winter it does not appear to hibernate, the holes and caves usually associated with hibernating being merely temporary shelters in very bad weather, or for the female during the birth of her young.

More important than the polar bear is the reindeer,

of which a peculiar variety rather smaller than the Lapland kind is found in Spitsbergen. They keep to the regions of best pasture, moss and willows, in places like the Sassendal, Adventdal, Wijde Bay and Edge Island, but before the excessive hunting of the last few decades they used to be numerous in all except the heavily glaciated regions. Even in the far northern Seven Islands, and on the small Wiche Islands, reindeer have been found. At one time they were very tame and even inquisitive, approaching a stranger rather than shunning him, and even nowadays they occasionally behave in this way. But hunting has tended to make them wary and difficult to approach.

The presence of the reindeer in Spitsbergen raises the problem of how they got there from their home on the Eurasian tundras. The reindeer is a land animal, and so, presumably, reached Spitsbergen travelling over the ice by the shortest sea route from land to land. From Novaya Zemlya to Franz Josef Land is about 240 miles, and from Franz Josef Land to the Wiche Islands about 215 miles. Between the Wiche Islands and Edge Island the distance is only 55 miles. There is no possible route which the reindeer could take that would entail a shorter journey over the ice away from all chance of getting food. A certain amount of evidence is forthcoming not only that reindeer do reach Spitsbergen from Arctic Russia, but that they come by the route mentioned.

A few years ago a male of great size was killed in the Sassendal : on one of his horns was found a piece of a bird's claw, attached by cotton threads. This

deer had also marks on his ears. Clearly the beast must at one time have belonged to a domesticated flock. There have been only three occasions on which explorers have brought reindeer to Spitsbergen. In 1872 Baron Nordenskjöld brought forty, all of which, with one exception, escaped: in 1882 the Swedish meteorological expedition at Cape Thordsen had six tame Lapp deer, some of which they certainly killed for food; and in 1913, the year after the animal in question was killed, Captain Arve Staxrud took a number with him for travelling in the interior. It therefore seems certain that this deer must have reached Spitsbergen by his own efforts.

The Samoyedes deck the horns of certain reindeer in the manner described and employ them in drawing sledges on some occasions of religious ceremony. Nordenskjöld records that hunters not infrequently find deer in Spitsbergen whose ears have been marked by chopping or otherwise. Some of these markings may be due to accident or disease: others have been described as too regular to have been made except with a knife. There are authentic tales of large reindeer making for the north of Novaya Zemlya in winter and disappearing, presumably over the ice, which stretches at that season, to the far north. Dr. W. S. Bruce has found remains of reindeer on Franz Josef Land, although during an entire year on those islands he never saw a living specimen. Possibly the remains were brought there by floating ice, but they may have originated from animals which have perished in the course of migration. We know that reindeer can travel long distances over pack-ice

and there is no insuperable objection to the theory that the Spitsbergen herds originated from deer which migrated from Arctic Russia via Novaya Zemlya.

Foxes of two kinds occur. The blue fox has a dark bluish-grey coat, both in summer and winter, while the commoner Arctic fox, probably the same as the cross fox of Northern Russia, has white underparts and a broad, brown band along the back and similar stripes on the limbs : in winter the Arctic fox has a pure white coat. A third species, the silver fox, possibly occurs : Dr. Bruce is almost certain that he saw one in the Colorado Hills on one occasion. Hunting has sadly diminished the number of foxes : one can spend a summer in western Spitsbergen without seeing a single one or even hearing a bark ; but in less frequented parts they are still numerous.

Among the sea mammals are whales of several kinds, the walrus, and several species of seals. The early Dutch and English whalers used to hunt the Greenland or right whale, valuable chiefly for the sake of its baleen or whalebone, a substance which grows in thin plates on the upper jaws. This was also the whale pursued in the open sea fisheries in the Greenland Sea. It is now very rare in those waters and seldom if ever seen around Spitsbergen. The whales pursued in recent years were species of finner whales and the bottle-nose whale. These are not infrequently seen off the coast. A smaller whale is the white whale or *hvidfisk* : it is about fourteen feet long and very active. White whales move in shoals and enter the fjords : for this reason they used to be easily caught and are now rare.

In the early days of Spitsbergen's history the walrus was the commonest animal in the coastal waters : now it is very rare even in the remoter parts of the north and east. They move in large herds and were often found lying on beaches or on the ice in great numbers. In the sea they are lively, and old bulls have been known to attack boats. Of the seals the bearded seal and the Greenland seal are the largest. Neither they nor the less common and smaller ringed seal nor the small floe-rat are fur-bearing species : they are valuable only for their oil. Hunting has reduced their numbers, but they are still plentiful.

Of the bird-life little can be said. The subject is a vast one, for Spitsbergen is a paradise of birds in summer. Kittiwake and burgomaster gulls, guillemots, little auks, and puffins breed in places along the coast in enormous numbers. Some places like Vogel Hook seem to be alive with them in July and August. Arctic terns and skua-gulls are common. Eider-ducks nest on many small islands off the coast : long-tailed ducks are numerous. Brent or barnacle geese and pink-footed geese are often to be seen up the fjords or in the open valleys. The beautiful ivory gull nests in Spitsbergen and Sabine's gull has been recorded. Little purple sandpipers strut about the beaches at low tide, and snow buntings are common : these are the only two land birds with the exception of the ptarmigan. The ptarmigan is unique in being the only land bird which remains throughout the year : in summer it is mottled brown and white, almost indistinguishable from the stony banks and rocks it

frequents : in winter it is pure white. Among rarer birds are the snowy owl, the razor-bill, the sanderling, and the great northern diver, the latter a new record of Dr. Bruce's on Prince Charles Foreland.

Fish are not numerous in the coastal waters with the exception of the cod, which is plentiful, and the harmless Greenland shark, which is found in all the fjords. It is not impossible that cod-fisheries might be profitable in the shallow water of the Spitsbergen Bank between Bear Island and Storfjord, but further investigations are required. A variety of salmon occurs in several rivers, and freshwater lakes, notably the Linné River at Green Harbour, and Lake Richard near Red Bay.

Invertebrate life is poor except in deeper waters. Winter ice, as usual in polar regions, prevents a littoral fauna, and the rock pools are a poor attraction to a naturalist. For the same reason seaweed is not common, although in Foreland Sound several sunken rocks are so well hidden by it as to increase their danger to navigation.

There is little sign of vegetation as one sails along the coasts, and of course the glaciers and the ice-fields are devoid of life. Even if vegetation is scanty, and in some parts almost absent, Spitsbergen is not a desert. To say that there are 130 species of flowering plants, and several hundred species of mosses and lichens recorded from Spitsbergen, may give little idea of the extent of the vegetation, but it shows at least that the climatic conditions are not altogether adverse to plant growth. In the valleys of central Spitsbergen there is frequently enough vegetation to cover the

ground with a close carpet of mosses, creeping willows, crowberries and saxifrages. Green Harbour no doubt received its name from its verdant appearance. The Sassendal, Adventdal, and de Geer Valley used to be great haunts of reindeer and ptarmigan because of the abundance of food: Wijde Bay still has this reputation for the same reason. The plateau at Cape Thordsen, between the hills and the waters of Icefjord, is covered for a square mile or more with a thick peat bog in which one sinks ankle-deep in summer—and there are other instances of similar bogs. But the richest vegetation lies in sheltered valleys, especially with southern exposure, below bird rookeries, where a plentiful supply of guano serves as fertilizer. In such places there are real meadows with grasses, sedges, buttercups, and cuckoo-pints, growing thick and luxuriant. One can lie on soft turf among bright-coloured flowers, basking in the sunshine, feeling very far from regions of snow and ice and nearer to the equator than the pole.

The plants of Spitsbergen have a familiar look to one who knows Norway or even the mountains of Scotland. The species that just hold a footing, and often a precarious one, on the summit of Ben Lawers or Ben Nevis, thrive in Norway and luxuriate in Spitsbergen. In other words, it is the Alpine species of our own country that form the flora of Spitsbergen. The common plants are yellow potentillas and rock-roses, white cuckoo-pints and whitlow grasses, purple saxifrages and champions, chickweed, the creeping willow, the scurvy grass and the white and yellow Arctic poppy. The last is the most hardy of all:

there is not a mountain top or a pinnacle too exposed for it to find a home. In wetter places there are plenty of buttercups, other kinds of saxifrages, campanulas, and gentians.

Of trees there are none, if we except the rare dwarf birch, which never grows more than two or three inches above the ground. The shallow soil and the cold, dry winds of winter are hostile to tree growth.

Many plants, like the poppy and the sulphur buttercup, push up through the snow and flower in June, as if anxious to make the most of the short summer. Others find the season too short for their seeds to ripen and can spread only in a vegetative fashion. The crowberry and the mountain raspberry, the latter comparatively rare, bear ripe fruits in favourable years. Otherwise the so-called scurvy grass and mountain sorrel are the only plants of economic value, though the meadow-grass and sedges in certain favoured patches afford enough nutriment for a pony. I have seen a few cows and horses searching with some success for pasture on the hillside of Advent Bay, near the mining camp of Longyear City. One must remember that great herds of reindeer used to find all the nutriment they required.

A striking characteristic of the Spitsbergen and other Arctic floras is the brilliance of colouring of many flowers, as well as their profusion in places. A yellow or a red flower, or even a white one, which we know in this country, seems to glow with a far more intense colour in polar regions. It is the same phenomenon with which all alpine travellers are familiar.

Enthusiastic travellers impressed with the wealth of plant life in places dream of sowing grass in Spitsbergen: there have even been murmurs about agriculture. Such dreams are doomed to failure. The lower ground in Spitsbergen when devoid of vegetation is bare for good reasons. Either the slope is too steep to allow soil to lodge, in face of the torrents of water from melting snow, or the ground is more or less saturated all the summer with cold water trickling down from snowfields and glaciers, and hard frozen in winter. None of these circumstances is conducive to plant growth. Finally there is the shortness of the summer, which even with the compensation of no darkness would never give time enough for grain to ripen.

A poor form of peat occurs in places which might serve for fuel if it could be adequately dried. It has on several occasions been used by shipwrecked men for building huts.

A peculiar phenomenon in Spitsbergen is the occurrence of what are known as polygonal soils. They have no particular relation to vegetation, at least in their origin, but may conveniently be described here. In places where there is a fine soil of moraine matter or of debris from the decomposition of friable rocks *in situ* the ground is covered with greater or smaller hexagonal markings, the hexagons being outlined by borders of fine but fairly porous material: inside the hexagon mud predominates. The hexagon may be a foot to ten feet in diameter, and generally fairly regular in form and arrangement, except on sloping ground, where if they occur they are elongated in

the direction of the slope. Not infrequently the surface of a large figure is broken into a number of smaller figures. Their origin is a little puzzling: many theories have been advanced in explanation. They always occur on badly drained ground and are probably connected with the slow soaking of the water through the soil.

As is well known and noticeable in any mud surface, fine soil on drying tends to split into rough hexagons, each being bordered by deep fissures. Thus the groundwork of the polygonal soil is formed. Surface water, flowing over the soil subsequently, will tend to drain into the fissures, washing away the finer material and gradually leaving a border of larger fragments. As time goes on the borders will widen and deepen, while the interior of the figure being protected from streams of drainage water will remain covered with fine soil. Gradually a few mosses, lichens, and other plants take root on the drier borders, the vegetation slowly and reluctantly invading the interior.

The wild life of Spitsbergen stands sorely in need of protection. The matter was discussed at more than one of the Spitsbergen conferences, but it shared the inconclusive ending of those gatherings. In 1912 a number of Norwegian men of science, most but not all of whom had personal knowledge of Spitsbergen, came to certain conclusions, the value of which was not enhanced by the failure to consult Spitsbergen naturalists from other countries with the exception of one German. The Norwegian experts gave grudging approval to any general restriction in hunting on the grounds that they were unwilling to affect a time-

honoured means of gaining a livelihood. They proposed, however, that steps should be taken to protect the reindeer, walrus, and ptarmigan, as well as many rare species of plants. And, finally, they suggested that a large area should be established as a sort of nature reserve: its boundaries were to Icefjord on the south, Wijde Bay on the east and the sea to the north and west, but Prince Charles Foreland was to be included. The suggestions on the whole were sound, although the area defined above happens to embrace some of the most important British mining estates, and so is not available as a nature preserve.

Like all Spitsbergen problems this one of protecting wild life becomes more complicated every year. It is most unlikely that mining companies will consent to any game laws made without their agreement, and it is equally unlikely that the various companies will agree on any general regulations with regard to hunting. Conditions differ on different estates. The only action that is at all probable is that sooner or later most mining companies will preserve for themselves the game on their estates and warn off all hunters. Possibly, however, by that time there will be no game left in western Spitsbergen.

IV

THE EARLY WHALERS

THE Muscovy or Russia Company, which figures prominently in the early history of Spitsbergen, grew out of the Company of Merchant Adventurers founded by the efforts of Sebastian Cabot in the middle of the sixteenth century. It was a counterstroke of the merchants of London to the dominance of the Hanseatic League. Later it came to be called the Greenland Company. The Muscovy Company sought a way to the East by the north of Europe and Asia. It was they who sent Willoughby on the voyage when he discovered Novaya Zemlya and Chancellor who found the White Sea. When their trade in Arctic lands began to suffer from Dutch competition the Muscovy Company tried to push into new seas. Stephen Bennet, one of their captains, sailing in the *Grace* in 1603, was ordered to try to make some discoveries on his return from Russia. This resulted in a visit to Bear Island, the first after its discovery by Barents. Bennet reported walrus and returned next year with another ship, which secured a fine cargo of walrus ivory. He repeated the voyage for several years. Meanwhile Spitsbergen was forgotten till Hudson's discovery of whales, seals, and walrus.

Jonas Poole, master of the *Amitie*, has the credit of being in 1610 the first whaler to visit Spitsbergen. Poole called at many harbours on the west coast, some of which bear the names he gave them, and secured a great quantity of walrus ivory, bearskins, and whalebone, the last picked up on the shore. He had fine stories to tell of his adventures and the richness of Spitsbergen seas. According to him whales were so numerous in some bays that they ran against the cable and rudder of his anchored ship.

For many years Spitsbergen was visited annually by the ships of the Muscovy Company. The vessels, judged from the modern standpoint, were very small; 150 tons was a large vessel and 50 tons was not the smallest. Sir Martin Conway thinks it probable that they employed Biscayan harpooners but that the early expeditions paid more attention to walrus than to whales. When the Dutch joined in the Spitsbergen fishery, as they did within a year or two of its start, they also employed Basque harpooners. The Basques in those days were the only whalers in Europe, and had been pre-eminent in this fishery for several centuries. From a beginning in the Bay of Biscay the Basques had in the course of time extended their fishery out into the Atlantic, and frequented the shores of Iceland, Greenland, and Newfoundland.

The Biscay or Atlantic right whale is closely akin to the Arctic right whale, so the Basque harpooners would feel quite at home in the Spitsbergen fishery. When the English and Dutch first turned to whaling it was the whalebone which they chiefly sought: the blubber was thrown away. The

whalebone continued to increase in value and has done so ever since : to-day it has a fabulous price. The value of the blubber was soon realized, and then the bays of Spitsbergen began to have a new importance as sites for the coppers in which the blubber was boiled to produce oil. The ships were in the habit of anchoring in their favourite bays and waiting for the whales to come in from the open sea. Then the shallops or boats were put in the water, and the whales were attacked and killed with harpoons and afterwards towed ashore. At first the whalers used to take their coppers aboard at the end of the season when they sailed for home. Later they found this a waste of labour, and used to leave them ashore over the winter. In this way whalers of different nationalities began to stake out claims to certain bays.

Although the fishing was good all along the west coasts, some bays were better than others, or at least were more accessible, and so much rivalry sprang up. A year or two after the fishery began, the Dutch staked a nominal claim at Amsterdam Island on Middle Gat by placing their coppers on the beach : the English did the same on Danes Island in Fairhaven or English Bay, as South Gat and neighbouring waters were called in those days, but not to be confused with Cove Comfortless, which is also called English Bay and was the site of some English coppers a few years later. The Dutch built a hut as far south as Bell Sound, but the English seized it on the plea that the bay was theirs : a second Dutch attempt had the same result.

Beside the Dutch ships which persisted in frequent-

ing Spitsbergen, despite the Muscovy Company's contention that their charter excluded them, there were English interlopers and a few Basque and Dunkerque ships. The Muscovy skippers resented the presence of every vessel which did not sail under their flag, and the resentment being mutual there were the makings of much trouble. The rival fleets were accompanied by armed vessels for protection : thus the Muscovy Company's fleet, in 1613, consisted of seven vessels, of which four were for fishing, two for discovery, and one, the *Tiger*, for protection. The *Tiger* was 250 tons, and carried 21 guns. She was successful in capturing several Dutch and Biscayan ships, including one of 800 tons, and making them disgorge their catch. The Dutch were their principal enemies and only one Dutch ship was allowed to return home with a cargo that year. The Dutch thirsted for revenge and soon got it. More generous treatment was accorded the Biscayans, most of whom were allowed to retain part cargoes.

The next year both rivals made great preparations for asserting their supremacy, and each determined to oust the other. The Dutch interests were consolidated in January, 1614, into the Noordsche Company, which was granted a three years' monopoly, to the exclusion of all other whalers, Dutch and foreign. This was a challenge to the charter of the Muscovy Company, and the English were not slow to take it up. The answer was the order in council which the Muscovy Company received from King James to uphold his right to Spitsbergen. The Dutch, although they sent several armed ships with their

fleet, seem to have had more peaceful intentions than the English. They merely wanted to be left in peace and would fight only if molested. This was consistent with the Dutch attitude throughout the period of disputes about Spitsbergen. But the promised excitement failed to materialize, and instead of fighting the rival fleets came to an amicable agreement to divide the bays between them for the season. Although this agreement was only for one season, both sides, and particularly the English, tried to maintain its permanency. The English were to have Bell Sound, Icefjord, Fair Foreland, including Cross Road and Fairhaven (South Gat). The Dutch might use any harbour to north or south provided no English ships were there before them. The English set up their coppers on Danes Island, and the Dutch on Amsterdam Island. Both nations agreed to chase away all interlopers. Next year armed ships again accompanied the Dutch but, apparently, not the English fleet. Danish men-of-war for the first time put in an appearance.

Trouble did not break out for a year or two, largely because the Dutch concentrated on the little island of Jan Mayen, some 540 miles from Spitsbergen, where the English left them alone. But, in 1617, the Noordsche Company, having had its monopoly renewed for another four years, sent several vessels to Spitsbergen, for which there was held to be no room at Jan Mayen. Sir Martin Conway has unearthed the story of these troubles. A ship belonging to the Muscovy Company found some Dutch vessels fishing in Horn Sound and ordered them off, saying that "if

the Capitaine of the English understood thereof he would take their provisions from them." They replied, "if they did he wold make some of the English plompe for it, and that they wold staie and fish there in despight of the English." But they thought better of it and sailed for Bear Island, only to return shortly to Horn Sound. There they found two English ships, instead of the Dutch man-of-war which they had expected. The Vice-Admiral of the English fleet was sent for from further north, but on his arrival found that one of the culprits had got clear with a good cargo. The other ship was despoiled of her blubber, coppers, and whaling gear, and then sent home.

Next year the Dutch fleet in Spitsbergen waters was much stronger than the English. There was trouble at Bell Sound and Horn Sound, but the English got the best of it before blows were exchanged. The Dutch were eager for revenge. They collected at Sir Thomas Smith Bay (Foreland Sound, English Bay and Cross Road), which they knew by long usage was regarded as an English fishing ground, and did their best to pick a quarrel in every possible way, but the English wanted to avoid trouble. On one occasion when Heley and Smith, two of the English captains, were on board a Dutch ship, the Dutch skipper said "our King of England was a Scotchman," a curiously truthful statement if intended to precipitate a quarrel. At last, hearing that other English ships might put in an appearance, the Dutchmen decided to precipitate matters. They sent for Heley, but he refused to come, answering that if they wanted him they

must come and fetch him. Ultimately, however, Heley and two others went to meet the Dutch, and were told that they must give up their oil or it would be taken from them and their ships would be sunk. The Dutchmen said that the country was theirs and that they were not going to lose it. The English skippers returned to their ships and made preparations to defend them. The Dutch attacked and overpowered the English ships, driving them ashore and killing several of the crew. Then they took all the English oil, whalebone, and gear, dividing it among the five ships which took part in the fray, and sailed away. Another English ship in Cross Road was also robbed. The Muscovy Company estimated their losses in this action at £66,436.

The matter led to diplomatic correspondence and the despatch of Dutch commissioners to London to settle the "Greenland dispute." The conference is referred to in another chapter. It awarded damages against the Dutch and ordered the Muscovy Company also to make restitution for their action the previous year, but apparently neither side ever paid anything. For three years English and Dutch were both to have access to the fishery. In practice, however, the *modus vivendi* reached by the whalers was that the Dutch retained the north-west bays and north coast. The Danes made use of the Dutch bays and were tolerated by the English in Fairhaven (South Gat) and elsewhere. The disposal of Edge Island and the rest of the east of Spitsbergen was omitted in the agreement. Whalers certainly frequented Edge Island, for ruins of their cooking stations are still to

be seen, but there is no record of their activity or of their nationality. There are some grounds, however, for believing that they were both Dutch and English, the latter being interlopers from Hull.

As for the Muscovy Company's bill for damages against the Noordsche Company nothing happened, except for periodical demands for payment on the part of the English and periodical excuses on the part of the Dutch. This went on for some thirty years, the English knowing quite well that their claim would never be met. National pride was satisfied in submitting it. English and Dutch were settling down in their respective spheres and finding enough to do without interfering with one another. They had verbal disputes but no violence ensued. At home in Europe diplomats waxed warm at times: Conway says there was even talk of war over Spitsbergen and other outstanding disputes, but in Spitsbergen the whalers paid little attention to such threats and managed to work on fairly amicable terms.

In 1623, the English protested against the presence of Dutch whalers on the grounds that the agreement of 1619 had expired. The Dutch pleaded ignorance and said that in any case there were enough whales for all. They seem to have been allowed to remain without further interference, the old division of the bays being maintained.

The English whalers, properly accredited by the London company, had some trouble with interlopers from Hull, whose boats, houses, and cookers they destroyed on one occasion. This led to the interlopers being forbidden by the Government from

going to the fishery, but they went nevertheless, and year after year brought home good cargoes of oil for the soap-makers. These disputes between various British whalers, which continued as long as the bay fishery lasted, arose in the desire of the London whalers to keep up the price of whale-oil by restricting the amount brought into the country. The whale-oil being required also in Scottish soap factories, a Scots patent had been granted to certain Yarmouth whalers who undertook to obtain a supply. This caused the Lord Chancellor of Scotland to take up the dispute, since "this kind of treatment is likely to breed trouble between the two countries." Again, the Privy Council forbade these whalers to sail. They defied the order and on their return were imprisoned.

The increase in the number of Dutch ships, which took place in the early thirties of the century we are considering, stimulated the London whalers to greater efforts and made them more anxious than ever to exclude interlopers from Hull and Yarmouth. On one occasion there was a fight in Horn Sound, in which several men were killed. The interlopers obstinately refused to retire from the fishery and would not be dictated to by the Londoners or their Government. In 1645, the London, Yarmouth, and Hull whalers joined forces, Horn Sound and Bell Sound being reserved for the Londoners. But the arrangement does not seem to have worked too well and the dispute dragged on, the interlopers gradually strengthening their position. A settlement was finally reached, in 1654, by which the English bays were to be divided between the whaling ports, but it

came too late : the bay fishery was virtually at an end.

But to return to the international rivalry. The Dutch, although friendly, or at least not in open hostility with the English, would tolerate no Basques. When a Basque whaler, under Jean Vrolicq, arrived in 1631, it was threatened away. The same fate awaited the Biscayans when they returned next year. Out of revenge they sailed to Jan Mayen, where they pillaged and destroyed the Dutch shore station, sailing home with rich cargoes of spoils. Next year Vrolicq was back in Spitsbergen defying the Dutch. Driven away from Kobbe Bay he established himself in Port Louis or Hamburger Bay, where he had good fishing, and amused himself by raids on the Dutch in Magdalena Bay, immediately to the north. This was one of the few occasions in which French whalers made themselves conspicuous in Spitsbergen. They probably anticipated other whalers in turning to the open sea fishery, in which they had long been experts in the Atlantic.

Before we trace the story of the later aspects of whaling it may be well to follow the fortunes of the Danes.

The Danes were tolerated in the Dutch bays and they had their own establishment in Kobbe Bay after they had left Amsterdam Island entirely to the Dutch. It was under Danish auspices that the Basque whaler of Jean Vrolicq came to Spitsbergen on the occasion recounted above, but on a later occasion, in 1637, Vrolicq had his catch and gear confiscated by a Danish man-of-war. As a rule the

Dutch did not trouble the Danes, but on the contrary the Danes, envious of the success of the Dutch and annoyed at their indifference to Denmark's claim to Spitsbergen, protested against the number of Dutch whalers. The Noordsche Company sent a propitiatory reply and put the blame on unauthorized interlopers. The Danes persisted in their argument and Danish men-of-war were even successful in molesting some Dutch ships, but the Dutch kept the peace. Finally the Noordsche Company's monopoly, renewed in 1635, expired in 1642, and the fishery was thrown open by both nations without reserve.

At this period Hamburg whalers appeared—hence the name of the bay north of the Seven Glaciers, which had previously been called Port Louis. Later in the century they came disguised as Danes, so as to escape the attention of French privateers, but in 1697, one of the record years in the whale fishery, Hamburg and Dutch men-of-war formed an escort for 51 Hamburg, 12 Bremen, 2 Emden, 1 Lübeck, 2 Swedish, 4 Danish, and 129 Dutch whalers. These Hamburg whalers persisted until the nineteenth century, following the changing fortunes of the fishery, but they had little to do with the story of Spitsbergen.

The bay fishery at length began to show signs of failing: it is a wonder that it had lasted so long. Some years there must have been several hundred whalers at work. About 1640, the whales showed signs of growing "shy of the Cookeries and anchorages of the ships, shallows, and what pertained to them." The whales were still in large numbers, but

they kept away from the land. To the open sea the whalers followed them, and year by year the bay whaling declined. As the distance of the whaling grounds from the shore increased the whalers made less and less use of the bays. They were convenient places for assembling the fleet before returning home, but the cooking had to be done at sea or the blubber taken to Europe. The Dutch, with their true commercial insight, were the first to realize that the bay whaling was at an end. About 1642, when the Noordsche Company's monopoly finally expired, hundreds of Dutch whalers flocked to the fisheries west of Spitsbergen, and they continued to do so for over a hundred years.

The southern or English bays were fished some years longer. There had been fewer English than Dutch ships in Spitsbergen, so the whales were less shy of the English bays. The Muscovy Company had always tried to restrict the number of whalers. The Dutch open-sea fishing, however, cut off the whales going inshore. And whalers of France, a country then at war with Great Britain, assisted in heading off the whales. And so the English bay fishery in its turn was abandoned: in the sixties only one or two ships kept it going every year. All the oil that this country required came from the flourishing Dutch fisheries.

Still there was not to be peace in Spitsbergen. French frigates made several successful raids on Danish and Dutch whalers, and on one occasion a Frenchman fought and sank an English whaler. In 1693, a French squadron of four vessels went north to

try its luck. They made several captures in Magdalena Bay and South Gat, and then two of the frigates pursuing nine Dutch vessels to Treurenberg Bay were surprised to find themselves facing forty whalers in all. The Dutchmen refused to yield and prepared to defend their ships. After a spirited fight the majority of the Dutchmen managed to put to sea, but thirteen were captured. The frigates were little hurt. Other ships of the French squadron captured fifteen Dutch whalers. The French continued year after year to attack the Dutch whaling fleet and generally got a ship or two; but the Dutch ships increased in numbers and the industry was never more prosperous. In 1700, according to Scoresby, Stone Foreland, on Edge Island, was the scene of a great whale fishery, and the next year there were 207 Dutch ships in the north.

All through the eighteenth century the Dutch whalers pursued their calling in Spitsbergen seas, but made only casual use of the bays. According to Conway they virtually ceased at the opening of the nineteenth century, and the last one was about 1864. By this time, however, Scottish and English ships were again in the north, but their fortunes, as far as they touch Spitsbergen, belong to modern history. In this chapter we are concerned only with the early whalers.

V

ADVENTURES ASHORE

WHALING was entirely confined to the summer. By September all the whalers had left for home and Spitsbergen was deserted until the following spring. The huts built on the shores of some of the bays were little more than storehouses for coppers and spare barrels. No one dreamt of inhabiting them in winter, and there was little cause to do so. During the winter months there was no one in the country to interfere with any property left ashore. The trouble with the Dutchmen, in 1617, seems to have made the Muscovy Company consider that it might be well to form some sort of settlement in Spitsbergen, though for what reason is not very clear. They considered the possibility of using Lapps for this purpose, believing no doubt that they could endure the cold. A license was obtained from the Tsar of Russia to enable Lapps to be engaged but there the matter ended. Efforts to obtain Englishmen for a winter settlement were unavailing. Bribes were offered, but failed to secure anyone. Finally, as a last desperate attempt, certain criminals under sentence of death were offered a reprieve and a generous reward on their return if they would spend a complete year in Spitsbergen. The men were

actually shipped north, but when the autumn came and they were to be left their courage failed them. They preferred to return to London and to be hanged rather than face a winter in Spitsbergen. Report has it that they were taken home and pardoned. The Muscovy Company made no more attempts to found a settlement in the Arctic. The Dutch efforts in this direction began at a later date.

The first winterers of which there is any record were eight Englishmen who were accidentally left behind in 1630. No doubt there may have been earlier instances of one or more men being marooned by accident, but, as no record of their adventures has come to light, the presumption is that they did not survive the experience. There is a full account of the adventures of the eight Englishmen during the winter of 1630-31, written by one of them by name Edward Pelham, a gunner's mate. The men had been sent to hunt reindeer, and on returning to Green Harbour, they found their ship had gone. In hopes of finding her in Bell Sound they put to sea in their boat, and after some perilous adventures arrived there only to find no sign of the ship. Their disappointment was great: "no other thing could be looked for but a miserable and a pining death, seeing there appeared no possibility of inhabiting there, or to endure so long, and so bitter a winter."

But they were men of good sense, and did not give way to despair. After deciding that they would winter in Bell Sound they made a trip to Coles Bay to hunt reindeer. The hunt was successful and they set out to return with the meat of nineteen reindeer

and four bears. The voyage was difficult on account of bad weather, and some of the venison was lost, but in the end they landed safely.

There was already a tent or hut in Bell Sound, "built of Timber and Boardes very substantially and covered with Flemish Tyles, by the men of which nation it had, in the time of their trading thither, been builded." It was 80 feet long and 50 feet broad, which seems to have been too big for the fancy of the stranded men. So they set about building a smaller hut within the larger one. Material was obtained from buildings in the vicinity. They got deals from other huts, a thousand bricks from the chimneys of coppers, and several hogsheads of lime, with which they made good mortar. The weather turned so cold that they had to light fires to keep the mortar from freezing. The supply of bricks was inadequate to line all sides of the hut, so they built two sides double filling the intervening space with sand. The hut was only 20 feet by 16 feet and 10 feet in height. The door was carefully padded "with a bed that we found lying there." There were no windows and the only light they got was through the chimney. Beds were made of reindeer hides. On the beach were a number of shallops left over winter by the whalers. Examining them carefully "we found seven of them very crazie, and not serviceable for the next yeare." These they broke up for firewood. For the same purpose they took some empty casks, two oil-vats, and whatever could be spared "without damnifying of the voyage the next yeare." They were absurdly careful of the interests of the Muscovy Company, and were

content to have a small stock of fuel rather than injure any useful gear, implements, and boats. In the early part of the winter they lived on their store of venison and the meat of three walrus they managed to kill. This meant short commons, so Wednesdays and Fridays were made fast-days. Rope yarn served for thread and whalebone for needles, so that they managed to mend their worn clothes.

As winter came on the men began to get very melancholy, and to lament their misfortune: they blamed their skipper for leaving them in the lurch and in the next breath excused him and feared that he and his ship might have perished in the ice. Evidently they were in a fair way to perish themselves, when once more they took courage. The cold became intense after New Year, and they suffered much from frostbite, but the returning sun gave them hope. "The brightnesse of the Sunne, and the whitenesse of the snow, both together was such, as that it was able to have revived even a dying spirit." When food was running very short one bear fortunately turned up: "with our hearty lances we gave her such a welcome as that shee fell downe, and biting the very snow for anger." The bear gave them good meals for three weeks, when they thought of using their reserve supply of venison. But luckily more bears turned up, and seven were killed. They could eat three meals a day, "which began to increase strength and abilitie of body in us." Guillemots, or puffins, and foxes were caught in traps and made good eating: eggs were soon added to their diet.

On May 25, two Hull whalers came into the bay

to look for traces of the men. The meeting is best described in Pelham's own words: "The Hull men now coming neare our Tent, hailed it with the usuall word of the Sea, crying, 'Hey': he (one of the marooned men) answered againe with 'Ho,' which sudden answer almost amazed them all, causing them to stand still halfe afraid at the matter. But we with-in hearing of them, joyfully came out of the Tent, all blacke as we were with the smoake, and with our clothes tattered with wearing. This uncouth sight made them further amazed at us; but, perceiving us to be the very men left there all the yeare, with joyfull hearts embracing us, and wee them againe, they came with us into our Tent. Comming thus in to us wee showed them the courtesie of the house, and gave them such victuals as we had; which was Venison roasted foure moneths before, and a Cuppe of cold water, which, for noveltie sake, they kindly accepted of us." Three days later the London fleet to which these men belonged arrived in Bell Sound and took them on board.

By the time of this adventure of the eight Englishmen, the Dutch settlement or whaling station of Smeerenburg, on Amsterdam Island, had grown in importance and size. It was founded in 1617, when the Dutch and Danes in a friendly spirit divided the site for their coppers, the Amsterdam whalers taking the east of the flats and the Danes the west. Posts bearing the arms of the two countries marked the limits of the sphere of each. Later the Amsterdam men were joined by Dutchmen from other parts, and the Danes left for Kobbe Bay.

The ships of each town—Amsterdam, Rotterdam, Middelburg, Flushing, Hoorn, Delft, etc.—moored opposite their own cookery. They lay at anchor with their sterns to the shore and launched their shallops to attack the whales. For Smeerenburg was not only the blubber boiling station but also the actual site of the most lucrative fishery. Each vessel brought sixty to seventy men since much labour was required in manning the shallops, boiling the blubber, and handling the casks of oil.

In Smeerenburg's best days the scene in summer must have been animated: in the harbour, perhaps several hundred ships with their boats out among the whales; ashore, rows of huts, storehouses, smoking cookeries and furnaces, and other buildings. The huts, always called tents by the whalers, ran to fairly considerable size: the largest were about 80 feet long by 50 feet wide and contained attics in addition to the main living room, in which there were bunks for the men employed ashore. A fort was built and manned with cannon as a protection against Danes, and a church was built. But Smeerenburg was not merely an oil factory. There were shops with tobacco and brandy for sale, and bakehouses where hot rolls were sold every morning. A horn was sounded to let the inhabitants know when the rolls were ready. If all tales be true, there were even ladies too in Smeerenburg who beguiled the leisure hours of the whalers. Between 1633 and 1643 the place had its greatest years of prosperity. Sir Martin Conway discounts the stories of a population of ten thousand, and thinks that there were never more than some twelve hundred.

A time came when the flats on Amsterdam Island were too restricted to hold all the cookers. Smeerenburg then overflowed across the strait to Danes Island, where the Harlingen and other cookeries were set up. That was the place where two and a half centuries later Andrée set up his balloon house, and Danes or Middle Gat was the first harbour to receive Nansen's weather-worn *Fram* after her three years' drift across the polar basin.

Smeerenburg was deserted in the winter, but, when the Basques destroyed the Dutch whaling station at Jan Mayen, the Noordsche Company thought it would be safer to leave a few men to protect their property in Spitsbergen. A polar winter still had terrors, but there was the example of the eight Englishmen who had managed to survive and were none the worse for their experience. So, in 1633, a number of men were found in the whaling fleet who were willing to be left for the winter, seven at Jan Mayen and seven at Smeerenburg. The winterers at Jan Mayen all died of scurvy, but those at Spitsbergen were evidently men of higher moral calibre and they all survived. A journal of their experiences was kept by their leader, Jacob Seegersz. Vander Brugge. He seems to have been well aware that inactivity and lack of fresh food would be fatal, and so he set his men to hunt whenever there was an opportunity of game. They went as far as Red Beach to shoot reindeer, and they ate birds and foxes, the latter of which they trapped. Bears were numerous, and the winterers had several exciting adventures in hunting them. Scurvy grass was carefully collected and used. The possibility of

pirates raiding Smeerenburg was never absent from their minds, for this was the reason why the winter colony had been formed. The men kept watch day and night and decided in the event of hostile ships appearing that they would light fires in all the huts, fly flags, fire shots from the fort, and make as much noise as possible, in order to give the enemy the impression of a strong garrison. But nothing exciting occurred. On the return of spring more food was obtained, and the seven men were well and strong when the whalers arrived in the end of May.

The experiment of wintering men had proved so successful, despite the tragedy at Jan Mayen, that there was no difficulty in finding seven men willing to be left at Smeerenburg the following winter. But they turned out to be poor creatures. Neglecting to hunt and to seek for scurvy grass they presumably fed on the salted meat left by the whalers. In two months' time symptoms of scurvy appeared. Instead of taking any steps to combat it they relied on Providence and grew worse. By the end of February only four were left alive; "four of us that are still alive lie flat upon the ground in our Hutts": "no Body is able to stir for Pain." The whalers found them all dead in spring. This seems to have been the last occasion on which men wintered in Spitsbergen until the Russian trappers came on the scene nearly a century later.

Smeerenburg had not many more years of activity ahead of it. Before the middle of the century it was on the down grade. As the whalers took to the open sea-fishing it was used only as a store place, and later

even the coppers were taken away and the ships no longer gathered there before sailing for home. When Martens, the Swedish scientist, visited it on a Hamburg whaler in 1671 Smeerenburg was falling into ruin, though some huts were still standing. A hundred years later nothing remained but the brick foundations and the graveyard.

There are many places in Spitsbergen where relics in the shape of brick foundations and weather-worn scraps of timber recall the whaling activity of three centuries ago. At several places on the north coast, at Danes Island, in Fairhaven (South Gat), in English Bay, on the Foreland and in Bell Sound, to mention only some localities, these remains are still to be seen. The great Richard lagoon on the Foreland must have been accessible to whalers or their boats, for there are the remains of brick foundations of coppers on its inner shores. I have seen a very weathered wooden spoon of curious design picked up on this spot.

But the graveyards of Spitsbergen are the most potent reminders of the past. On the Norway Islands is one with over two hundred graves, and Parry spoke of a smaller one in Treurenberg Bay with dates on the crosses as far as legible ranging from 1690 to about 1775. One on the Foreland near Heemskerke Ness contains scores of graves, some with the remains of crosses still visible, but most broken open by bears and foxes, and containing empty mouldering coffins. Scattered human bones lie around in all directions. On some of the crosses dates can with difficulty be deciphered : the earliest appear to be 1725 : no doubt earlier inscriptions have become quite illegible. In

English Bay there are also a number of broken graves, from which the crosses have long since disappeared : one at least is lined with stone.

The cemetery at Smeerenburg was on Deadman's Island, but there was another on Amsterdam Island itself, where a century ago at least a thousand graves could be counted. In 1878, Holland sent the *Willem Barents* to Spitsbergen to erect a monument at Smeerenburg to the winterers, whose stories have already been recorded, and to repair, as far as possible, any graves that could be found. The cairn erected bears this inscription :

In Memoriam
Spitsbergen, or Newland,
Discovered
in 79° 30' N. Latitude
by the Hollanders.
Here wintered, 1633-34,
Jacob Seegersz. and Six others.
Here wintered and died, 1634-35,
Andries Jansz. of Middelburg
and
Six others.

In 1906 Holland again showed herself mindful of her early Arctic pioneers. The cruiser *Friesland* was sent to Spitsbergen to put in order any graves that could be found. There were two graveyards on the north-west coast of Danes Island, one of which appeared to have been Danish ; one on Deadman's Island ; and the principal one on Amsterdam Island.

Across the waters of the Sound, on the shore of the mainland, was found a graveyard with over four hundred graves. These were later than the others, most dating from the eighteenth century, and were in a better state of preservation, largely due to the absence of tourists. The *Friesland* collected all the scattered bones on the south of Amsterdam Island and erected a large cairn in memory of the men.

There is no memorial, not even a single cairn or headstone, to record the early English whalers who laid the foundation of the commercial development of Spitsbergen.

VI

ANNEXATIONS AND DISPUTES

NOT long after Barents had discovered Spitsbergen, disputes as to its ownership arose in Europe. Once the Muscovy Company had revealed the wealth of the country, competition among the whalers was keen. The English had no competitors at Bear Island in the early years of the seventeenth century, when they started the fishery ; but, as soon as they moved north to Spitsbergen, the Dutch were on their track. As already pointed out, this rivalry between English and Dutch was of long standing. It was largely in order to fight Dutch competition that the Muscovy Company had pushed its way northward.

Barents, on his discovery of Spitsbergen in 1596, set up a post bearing the Dutch arms, in about lat. $79^{\circ} 50' N.$, either at Cloven Cliff or at Vogelsang in the north-west of the archipelago. This doubtless signified a claim to the country on behalf of Holland. In any case Barents seems to have taken formal possession in Magdalena Bay, a little further south. Holland, however, seems to have been little concerned with her new territory. It is indeed doubtful if the Dutch claim had any validity since Barents thought the country to be part of Greenland, in which case it

already belonged to Denmark. The Muscovy Company, if they were aware of the Dutch claim, paid it scant respect. Marmaduke, one of the first English whalers to visit Spitsbergen, removed the post which the Dutch had erected.

In 1613 the Muscovy Company obtained from King James a charter giving them the sole right to the Spitsbergen fishery and excluding all other ships, whether British or foreign. The charter proving to have as little effect as might be expected, the Muscovy Company went a step further in the following year by obtaining an order in council to uphold the King's right to Spitsbergen. Baffin and Fotherby, armed with this order, set up the King's arms at various places in the north-west, including Magdalena Bay, Hakluyts Headland, Red Cliff (Red Bay), and Point Welcome. At each place a cross, bearing the royal arms and the Muscovy Company's crest with the date attached, was erected. The ceremony in Magdalena Bay is described. Fotherby cut a piece of earth and, taking it in his hand, made this formal declaration: "I take this piece of earth as a signe of lawfull possession of this countrey of King James, his New-Land and of this particular place which I name Trinitie Harbour, taken on the behalfe of the company of merchants called the merchants of New Trades and Discoveries, for the use of our Sovereigne Lord James, by the grace of God King of Great Brittain, France and Ireland, where royall armes are here set up, to the end that all people who shall arrive may take notice of his majestie's right and title to this countrey and to every part thereof. God save King James." At

Point Welcome, on the north coast, Fotherby set up a cross "and nailed a sixpence thereon with the King's arms." This cross was removed by the Dutch a few weeks later and replaced by one with Prince Maurice's arms. Fotherby, however, happened to call at Point Welcome a second time before returning home and pulled down the Dutch arms once more, erecting the King's arms, this time "cast in lead."

The Muscovy Company's captains by this date had decided that Spitsbergen was not part of Greenland. Their annexation of the country did not therefore trespass on any prevailing rights and must be considered to have been a perfectly legitimate act. The name King James Land was never used for the country which in actual practice was oftener called Greenland than Spitsbergen. Major Isachsen says that he has even heard it called Greenland by a modern Scottish whaler. In modern maps the Norwegians have tried to delete Fotherby's name even from the north-west corner of Spitsbergen, substituting one of their own, King Haakon Land, which has neither historical significance nor traditional claim.

Fotherby's annexation does not appear to have moved the Dutch Government to protest, although various Dutch writers waxed indignant. Failure to protest was due, not to the Dutch being in doubt regarding their right to Spitsbergen, but their lack of territorial ambitions. The free right to hunt whales in Spitsbergen waters and to make use of the bays concerned the Dutch a great deal more than any Sovereign rights. The real answer to the English

action was the charter granted by Prince Maurice of Orange to the Amsterdam whalers, granting them a monopoly in Spitsbergen waters. This monopoly was renewed from time to time as long as the bay whaling lasted. The subsequent disputes among the whalers turned more on the clashing of the English and Dutch fishing monopolies than the ownership of Spitsbergen.

Meanwhile another claimant had appeared. Denmark's chief claim to Spitsbergen was based on the ground that it was part of Greenland, although she never insisted on her rights until the Muscovy Company had revealed the value of the fisheries. If Spitsbergen had been part of Greenland this claim would have had some substance. As it was, it had none.

As if doubtful of the strength of this claim, Denmark put forward another. From the days when the Norsemen ruled the seas in Western Europe the Norse kings had held a traditional sovereignty to the Arctic Ocean. In Harald Haardraade's saga, 1046-1066, the northern boundary of the kingdom of Norway is placed in the far north of Greenland. Sturla Tord-sön's saga of Haakon Haakonsön, 1261, tells of the "outposts and Marches of the North":

"Thou hast upheld thy right over the cold lands
Right under the North Star, O Mighty Lord. The valiant
rejoice.
No other King save Thee, has proclaimed his Kingdom there."

This right, which was acknowledged by Greenland in 1258-61, was unchallenged as long as the Arctic Seas were considered, except by the Norsemen, to contain

nothing of value. Nor indeed was there any seafaring people in Western Europe with the power to dispute it in mediæval times.

This right of the Norse kings was revived in the seventeenth century. King Christian, in a letter to King James in 1618, said that his sovereignty of Greenland applied to all regions in the north with the exception of those belonging to the Russian Crown. Great Britain paid little attention to this claim, although otherwise it met with some respect in Europe. But it was a poor plea to put forward as a claim to Spitsbergen and as weak an argument as the Greenland myth. For its application to the ownership of Spitsbergen must obviously have depended on whether Spitsbergen had been discovered in the time when it was made and accepted. It has already been shown that this is doubtful; in any case it has not been proved. The plea was therefore irrelevant to the country in dispute. A land cannot be claimed before it is discovered. If it had been discovered, why was its existence totally forgotten until the Dutch found it? We have dealt with this contention at some length because it has recently been brought forward again as a basis of Norway's right to Spitsbergen.

Denmark's attempt to tax Spitsbergen whalers seems to have been successful for a year or two, but by 1614 the Muscovy Company denied the Danish right and refused to pay. Denmark then decided to take strong measures, and next year sent three men-of-war to Spitsbergen in command of Sir John Cunningham, a Scot in Danish employ, with orders

to assert Denmark's sovereignty over this part of "Greenland." There is no evidence that Sir John Cunningham was successful in his mission. On the contrary, Danish whalers fished in Spitsbergen waters only by the tolerance of the English and Dutch, to whom they sometimes had to pay tribute for the concession.

As the fame of the Spitsbergen fisheries spread disputes between rival whalers became frequent. In 1614 the Dutch and English captains in Bell Sound had made a working arrangement by which four harbours were to be English and the rest Dutch, provided they were not already occupied by English ships. Both Dutch and English combined to drive off trespassers of other nations. This agreement only lasted a year, but in 1618, after serious fighting in Spitsbergen, an attempt was made to reach a lasting agreement. Charters, monopolies, and interdicts had all proved equally useless. Each side must give way to the other in order that a *modus vivendi* might be reached. Fighting interfered with whaling and was very detrimental to profits. The English claim for damages against the Dutch in a fight referred to in a previous chapter amounted to £66,436. Dutch representatives were sent to London to discuss this claim and other matters arising out of the dispute. They had long discussions with the British commissioners before any decision was reached.

It was clear that in those days Britain would not suffer any interference with her subjects' rights in Spitsbergen: what would Lord Digby and his fellow-commissioners have thought if they had been able to

foresee the weak policy of the twentieth century diplomats over the same problem? The conference ended by King James insisting on his sovereignty over Spitsbergen, but agreeing not to enforce it for three years. For that period the Dutch and English were to have equal access to the fisheries. The Dutch were to pay damages within three years, when the Muscovy Company were to make good their spoliation of the Dutch. The west coast bays were to be divided between the two nations, the English representatives refusing to accept the Dutch suggestion of dividing Spitsbergen at the latitude of Cape Cold, the northern end of Prince Charles Foreland, the Dutch to have everything to the north, and the English everything to the south. The acceptance of such a condition would have nullified King James' claim to the country as a whole.

Denmark was not consulted in this arrangement, but King James notified the King of Denmark that his whalers would be allowed to fish in Spitsbergen waters, provided they did not sell their catch in British markets and did not transfer their rights to other nations. This last proviso was no doubt designed as a protection against Basque competition. If these conditions were accepted by Denmark, King James went so far as to say that English whalers would even render assistance to Danish whalers. For reasons that will appear later, it is important to note that Britain and Holland were the only signatories of this agreement. The English offer to the Danes seems to have been in the nature of a concession to Denmark's claim to Spitsbergen. It was an

attempt to keep the peace without admitting the legality of the claim. Denmark had perforce to submit.

Next year King James went even further in his attempt to make peace. He suspended for a period of three years his interdict of 1613 against Dutch vessels. This was the natural corollary of his agreement with the Dutch, and it was a policy of discretion since the interdict has never been of any avail. At the same time, it was expressly stipulated that the concession was without prejudice to King James' claim to the sovereignty of Spitsbergen as a whole. Once again Holland did not dispute the claim.

The division of bays worked fairly well in practice and there were only occasional quarrels. The Danes fished chiefly in the Dutch bays and were unmolested until they broke the terms of the agreement. Both English and Dutch were hostile to Biscayan whalers, dreading their greater skill, and used on occasions to combine to drive them away. The Danes one year tried to send two Biscayan whalers disguised as Danes. The ruse was unsuccessful and the Biscayans had to retreat in the face of threats. A great deal of futile correspondence resulted between the French and Dutch Governments over this incident, but nothing came of it. Perhaps in the long run the Biscayan lost nothing, because the hostility they knew was their lot in Spitsbergen drove them to the more profitable open sea fishery, where they had no competitors at the time, and which repaid them handsomely.

King James clung tenaciously to his sovereignty of

Spitsbergen. Three years after his offer to Denmark he repeated it. Denmark again accepted it, ignoring the implication that it denied Danish sovereignty. A treaty of commerce signed between Denmark and Britain in 1621 contained no reference to Spitsbergen, despite all King Christian's endeavours to have one included. King Christian was playing a losing hand, but he did not give in yet.

In 1622 there was again a crisis. The Dutch whalers had their charter of monopoly renewed by their Government. The English promptly retaliated. King James' agreement with the Dutch expired that year, and in order to assert his authority he announced that any infringement of the fishery would be considered a breach of treaty. Probably he had little hope of the Dutch paying any attention to his threat. In this he was right, and the fishing continued as before, the Dutch and English each keeping more or less to their own bays. Henceforth, save for a few quarrels of a trivial nature, the Dutch and English managed to pursue the industry without offending one another, although mutually jealous and suspicious.

The foundation of shore stations, and particularly of Smeerenburg, helped firmly to establish rights in various bays and the question of the sovereignty of Spitsbergen was allowed to drop. It was only the Danes who continued to pay any attention to it. The Dutch were always desirous of avoiding any controversy with Denmark: they cared little who claimed Spitsbergen. In a letter to King Christian, in 1632, the States General of Holland affirmed that

the question of the sovereignty of Spitsbergen was not to be discussed in Holland, and they implied that Denmark's claim was not questioned by them. In 1634 King Christian was still harping on his traditional right to the Arctic Seas, and tried to use this as an argument against Basque whalers. But in 1642 Denmark reluctantly bowed to the inevitable and agreed to the Spitsbergen fishery being thrown open to all nations. That was the year when the Noordsche Company's monopoly finally expired. Echoes of Denmark's claim were heard towards the end of the century. A clause was inserted in the Treaty of Land of 1679 between Norway-Denmark and Sweden, giving the Swedes the freedom of the Spitsbergen fishery, which in point of fact they had already enjoyed. Finally, in 1692 Denmark claimed the right to tax Hamburg whalers going to Spitsbergen, but her success in doing so was short-lived. Not another word was said by Denmark or Norway about their claim until the twentieth century. When the Russian trappers virtually colonized Spitsbergen, Denmark had nothing to say by way of protest. It must not be forgotten that in these days Denmark and Norway were still one kingdom, so that Denmark might have reasserted either her claim to "Greenland" or Norway's traditional right to the Arctic Seas. The failure to do so can be interpreted only as implying the abandonment of the claims.

VII

THE RUSSIAN TRAPPERS

THE whalers paid little attention to the fur-bearing animals. Their interests were almost solely in the sea. Not that they were ignorant of the resources of the land, for bears, foxes, and reindeer were very numerous in their days. But their occupation was a summer one, and at that season the foxskins have little or no value, and the skins of bears and reindeer are of less value than in winter. Jonas Poole, reporting on the resources of Spitsbergen, mentioned reindeer, bears, and sea-fowl: probably he ignored foxes as being of no importance. In 1610, in addition to his bag of walrus, he brought home fifty-one deerskins, thirty bearskins, and three live bear-cubs. Danish whalers, some years later, brought several live bears to Copenhagen, where they seem to have excited much interest, particularly as regards their powers of swimming. In fact, the frequency with which the whalers encountered bears is not a little surprising considering that whaling was only a summer industry.

The polar bear, at least nowadays, is not a summer inhabitant of the west coast of Spitsbergen, although he is not infrequent on the east and north when those coasts are invested with pack-ice. As already ex-

plained, the polar bear is really a marine animal, being at home on floating pack-ice. Probably it was because the whalers often came in contact with the pack in the north-west of Spitsbergen that they so often saw bears, which undoubtedly were more numerous then than now. The narratives of the whalers often contain stories of adventures with bears, and some of the stories evidently grew in the telling. Sir Martin Conway records a famous bear story which has survived until the present day. It was told to him in Holland by a descendant of the hero of the tale. His descendants seem to have inherited the fame of "the man under the bear"; they had a drawing of the incident cut in stone in their house in Zaandam, and had kept the skin of the bear as a family heirloom.

The first winterers in Spitsbergen in 1630 record in their journal that they were terrified at the prospect of "savage beares and hungrey foxes which are not only the civilest but also the onely inhabitants of that comfortlesse Countrey." However, when their stock of venison and whale-meat was exhausted they seem to have overcome their fears and attacked a bear which they successfully killed. This bear fed the nine men for twenty days—"for shee was very good flesh and better than our venison." After that they killed others, and trapped foxes also for food. But they fell ill from eating bear's liver.

It was Russians, however, who initiated the fur-trapping industry in Spitsbergen. Accustomed to this occupation in Arctic Russia, and keenly alive to the profits accruing from it, they naturally found

themselves well-suited to pursue it further north. Their attention may have been drawn to Spitsbergen by the English and Dutch whalers, possibly by the experiences of wintering parties. It has been suggested that Russian trappers frequented Spitsbergen, or Grumant as they called it, long before the days of the whalers, but there is no evidence in support of this contention. The whalers never mentioned them, which they would surely have done had they found them in possession. The date of the beginning of the fur-trappers is uncertain, but it must have been sometime between 1715 and 1720 that the Russians first arrived. They came in search of white whales and walrus besides furs. The white whales were frequently caught in nets, a method which has persisted until the present day. The walrus hunting must have been very profitable, for we hear of one party which took twelve hundred walrus alone. The wintering parties used to hunt in the sea as soon as the ice broke up in summer. In frail boats they went as far as thirty miles from land in search of white whales, walrus, and seals: occasionally they caught a bear swimming far from land.

One of the earliest Russian parties whose story is on record went to Edge Island in 1743 to fish white whales. They had no intention of wintering, but four of the party were accidentally left on shore and could not rejoin their ship, which sailed away without them. It was never heard of again, and so no one knew that these men were stranded in Spitsbergen. Their story is as fascinating as Robinson Crusoe, and circumstances were certainly less favourable than on

Juan Fernandez. Each of the four had taken ashore with him a knife, an axe, a kettle, a tinder-box and tinder, a musket and twelve rounds of ammunition, twenty pounds of flour, and some tobacco. Thus provided they prepared to face an interminable exile. They built a house of driftwood, of which they fortunately found plenty. Then they killed a bear, which must have cheered them up a good deal. The tendons provided bow-strings, and nails were used to make arrow- and spear-heads. Clay which they found on the island provided material for a lamp, in which they burnt reindeer-fat by means of a wick, made partly of linen and partly of cordage found among the driftwood. They made clothes from skins, using sinews for thread, and making needles from bits of iron. There was no lack of food. For want of fish, fast days could not be observed. They managed to kill 150 reindeer, besides foxes and bears. The meat was eaten raw, in order to save fuel, or smoked by being hung in the roof of the hut. In summer it was dried in the sun. A diet of reindeer and fox-blood was found to counteract scurvy. One man who refused to drink it died of the disease. The other three men survived for six years, until rescued by a chance vessel and brought back to Arkhangel. There they found that they had developed a curious dislike for both bread and alcohol.

Their story created some stir and was carefully taken down by a member of the Imperial Academy of St. Petersburg. His pamphlet was subsequently translated into various languages. These men, particularly the three survivors, must have been men

of exceptional character and resource to face their misfortune with so much foresight and hope. Their experiences undoubtedly drew attention to Spitsbergen and prompted other Russians to winter there. For the three sailors had managed to bring back with them two thousand pounds of reindeer fat and many furs and hides, so their exile was not altogether a waste of time. Some Samoyedes who heard these men's account of Edge Island were so struck with the prospects of the country that they wanted to be transported there with their wives, children, and reindeer.

The Russian trappers came from Arkhangel, Mezen, and other White Sea ports. They used to leave in June and return in September, unless they wintered. The vessels, or lodjas, were of 60 to 160 tons, and usually manned by a crew of about twenty. When the party wintered the lodja was generally drawn up on the shore. Traces of abandoned lodjas, useless because all the crew had perished probably of scurvy, were still to be seen half a century ago at some of the trappers' haunts. Many of the trappers were sent north by the monks of the famous Solovetski monastery in the White Sea. The monks knew where to make good profits and they seem to have persisted long after other adventurers had given up the industry. The Russian White Sea Company was another patron. In 1804 the radius of its operations was declared by the Tsar Alexander I to embrace "not only the White Sea but also the islands of Grumant, Novaya Zemlya, Kolguev, and, generally, the Northern Ocean and the Arctic Sea."

The trappers were paid by shares in the "bag": this gave a man about enough to live on for a year. The owner was in the habit of giving them an advance before starting. A trapper normally spent his loan on getting riotously drunk, saving only a few kopeks to give to the church.

The chief resort of the Russian trappers was Edge Island, where for over a century there were probably always winterers on the south-east coast. They frequented also Bell Sound, which was then called Klom or Klok Bay; Green Harbour, where Russian Valley is now, strange to say, Russian mining territory; Prince Charles Foreland, where they are said, though on doubtful evidence, to have favoured the low, flat Foreland Laichs, and certainly had a settlement on the South Point; Cross Road, since misnamed Ebeltoft Haven; King's Bay, and other bays on the west coast. The north coast also knew them, and they went as far east as Hinlopen Strait and North-East Land, but east of Liefde Bay there were only outposts. Sir Martin Conway thinks that they gradually spread west and north from their beginning on Edge Island, moving as game began to get scarce. There are few headlands or bays in western Spitsbergen where no Russian huts or crosses have been recorded: at many, graves, or the remains of graves, very probably of Russians, can still be seen. Every traveller in Spitsbergen has come on open coffins and human bones scattered by bears and foxes.

But the ubiquity of traces of these trappers does not necessarily imply that their numbers were great.

Each autumn the party arriving from Russia chose a new site for its winter camp, and comparatively few places were inhabited every year. In addition to the headquarters, comprising two or more large huts, the party erected outlying rough huts along the coast for many miles in both directions. Thus a few men accounted for many huts, and their relics suggest a large Russian population in the past. Very often the logs of the principal hut, which was well built, were brought from Russia, but driftwood generally served for the outlying huts. Large Russian crosses were erected in the vicinity and the remains of some of them along with the huts have stood until recent years: there used to be one on Cape Lee, on Edge Island, at a height of one thousand feet.

Some huts were as much as thirty feet square, built of logs caulked with moss and with board roofs tarred and weighted with stones. The outstations were merely huts some seven to eight feet square. John Laing, who was surgeon on the whaler *Resolution*, in which Scoresby visited Spitsbergen, describes several Russian huts which he saw. One on Prince Charles Foreland had glass windows and a storehouse containing meal, pease, and eggs, the last far from fresh. He says the trappers used to bring provisions for eighteen months, including rye, oatmeal, barley, peasemeal, salt beef, salt cod and halibut, curdled milk, honey, and linseed oil. "Arkhangel supplies them with dried fish, rye-meal, and an abundant supply of whey. This last constitutes their chief drink and is likewise used in baking their bread. Their beds are principally composed of skins of the

animals which they kill, and of these they also make garments which they wear with the fur side next their bodies. The walruses and seals afford them a plentiful store of their favourite delicacy—train-oil, and the bears, deers, and foxes fall frequent victims to the dexterity of these excellent marksmen.” He describes a visit made by the trappers to his ship, and says, “when set down to meat they preferred a mess of biscuit and whale-oil to all the dainties placed before them. Of this coarse repast they ate with a sufficient healthful appetite and in their own language pronounced it good. They had the complexion of Siberians and were dressed in bear and deerskins. They had an athletic and vigorous appearance, though somewhat stiff and cramped by the extraordinary cold to which they are exposed. During the time they were on board, and particularly while at meat, they behaved with a decorum and gentleness which could hardly be expected from their grotesque appearance, and the neatness of their fowling-pieces, boat-tackling, etc., manifested a taste and ingenuity of which the inhabitants of a more refined country need not be ashamed.”

This account leaves an impression on the reader that these trappers were not exactly such barbarians as might be expected from the nature of their calling and their rough upbringing in remote uncivilized Russian villages. Keilhau in 1827 paid a visit to the same settlement on Edge Island which Lamont found deserted about thirty years later. There were several solidly built log-houses with earthen floors. They had no windows, but a sign of grace was the

bath building. The house had loopholes from which to look out for bears, although the dogs which the trappers always had with them gave timely notice of the approach of these animals. On an eminence near by was a sort of look-out tower, probably used in searching for the boats when out sealing and walrus-hunting.

Well built as many of them were, the huts as a rule no doubt were filthy in the extreme and must have stank of blubber and rancid fat. Curious small rakes, used as back-scratchers, were part of the trappers' equipment, and tell their own tale. Scurvy accounted for many deaths, although the first care of the trappers in autumn was always to lay in a stock of reindeer flesh, which they preserved by smoking. They also ate bears'-flesh and used a decoction of scurvy grass as an antiscorbutic. Another preventive was apparently the mountain raspberry baked with rye-flour, but this must have been a rare delicacy since the plant is not common and its fruit seldom ripens in Spitsbergen. When one remembers that in those days scurvy was a mysterious disease, the origin of which was quite inexplicable, it is surprising that the trappers had hit on the modern remedies. Extreme sleepiness is one of its symptoms, and in order to keep awake when there was no work to do they would sit and tie knots in ropes and untie them and then tie them again, an occupation sufficiently monotonous one might think to put anyone to sleep. Sleepiness in the polar night is not necessarily a sign of disease: in the winter darkness man seems to revert to the hibernating habits of some remote

ancestor and can easily sleep twelve hours on end.

Some of the trappers must have understood the value of exercise as a preventive measure. They even shovelled snow from around their huts when it was too dark or windy to go for walks. Lamont in 1858 visited a former Russian settlement on Edge Island, and describes his discovery of a bat and wooden balls. Perhaps with these they played some sort of game as a health measure, though in that particular place all the trappers are said to have died of scurvy some eight years before. The same author relates a tragedy at Whales Point on Edge Island, where a number of trappers had collected to await the relieving vessel from Russia. The vessel was apparently lost at sea on the way north, and nothing was known of the marooned party till some Norwegians happened on the place later in the year and found fourteen graves, two corpses on the threshold and two inside the hut. From a log kept by one of the last survivors it appeared that one by one they had died of scurvy and hunger. Weakened by disease they had been unable to get afield in search of game. Scoresby relates how a Whitby whaling skipper going ashore in King's Bay to examine a hut found a corpse on the floor but no sign of any other inhabitant. They must have died one by one and been buried in the snow: probably bears had carried off the bodies.

The Russians feared the winter winds and darkness, and had great rejoicings on the return of the sun. The dreariness of the polar night tells badly on uneducated men, and inactivity promotes liability to



A HUNTING SLOOP HOMEWARD BOUND.

frostbite. Many of them lost toes and fingers : others very probably died of blood poisoning from the same cause.

Despite its discomforts and dangers the life had an attraction for these adventurous men. When they survived they were willing enough to return to Spitsbergen. There was one by name Staratschin, said to be a descendant of a family of Spitsbergen trappers, who spent fifteen consecutive years and a total of thirty-nine years at his hut near Green Harbour, where he died and was buried in 1826 at the Cape which now bears his name. Another Russian is said to have lived thirty-six years, summer and winter, in Bell Sound.

Early in the nineteenth century the numbers of Russian trappers in Spitsbergen began to decrease. At the date of Keilhau's visit there were comparatively few. He records a grim story from Horn Sound, where in 1820 thirteen corpses were found near a hut, three of them devoured by bears or foxes. He believed that these trappers had been murdered by freebooters, not improbably Norwegian hunters, for the sake of their collection of furs and hides. In 1818 there were a few Russians in Hamburger Bay, and in 1852-53 we have the last record of their wintering, this time in the vicinity of Red Bay, where there were only six survivors out of a party of eighteen. They had gradually moved northward, although in 1850 there were still a few on Edge Island. At Bear Island there were Russian hunters late in the eighteenth century, if not at an earlier date, and they continued in the early years of the nineteenth century. The name of

one of the harbours recalls these Russians. Over the ruins of a hut and a grave, with a skeleton in Russian boots, the cruiser *Svetlanda* in 1898 raised the Russian flag and erected a board bearing the notice in English and French : " Belongs to Russia, Captain Abaza, Croiseur *Svetlanda*."

Despite their activity on most of the coasts, the Russian trappers added nothing to the map of Spitsbergen. They were practically all illiterate men, unable to record what they found and saw. Theirs was the dark age in the history of Spitsbergen.

VIII

NORWEGIAN HUNTERS

BEFORE the Russian trappers had ceased, Norwegians had begun to come to Spitsbergen. Unless it was competition that drove the Russians out of the country, it is difficult to account for their decline. The Norwegian hunters first arrived about 1795, but it was some twenty years later before they came regularly and in large numbers. There were also Hamburg sloops in those days, and later on a few Danes. It seems that in 1819 the British Vice-Consul at Hammerfest, by name Crowe, sent a sloop to Bear Island and Spitsbergen to investigate the hunting prospects. The report was favourable, and Crowe repeated the venture for several years. These enterprises induced independent hunters to try their luck in the Arctic hunting. The expedition generally left in March and returned in October. White whales, seals, walrus, and occasional reindeer were the hunters' bag, though, if some of the stories of the time are true, Russian hunters were more than once robbed of their winter's haul of skins. In 1827 Keilhau reported that the Spitsbergen trade was the main support of Hammerfest and had driven out the Russian trade in Arctic produce. By the middle of the century Hammerfest must have acquired that

smell of oil and rancid blubber which is its most characteristic memory to those who know it. Later in the century Tromsø became a great rival and has now attained more importance than Hammerfest as the port for Spitsbergen. Tromsø even speaks of Spitsbergen as its hinterland.

Walrus hunting used to be the chief occupation of the sloops, small tubby vessels of some twenty to thirty tons displacement. The walrus frequent relatively shallow water, where they were killed from boats with harpoons and finished with lances. Sometimes the hunters had the good luck to find hundreds lying huddled together on some beach: then there was an orgy of slaughter. The Thousand Islands, Hope Island, and the Ryk Yse Islands used to be great haunts. Sloops counted on two and even three full cargoes every summer, but the pace was too quick. By about 1850 a skipper thought himself lucky to get one cargo a season, and often had to return, after four months' work, with his vessel only half full of tusks and oil. When the south coast walrus haunts were depleted the sloops sometimes tried the north coast: Mofen Island was one of their last resorts.

Shark fishing used to be an important occupation around Bear Island and in Spitsbergen waters. There are still plenty of sharks, but the occupation has long since been abandoned. The sharks were caught on long hempen cables, baited with seals' blubber, and were drawn on board by a windlass. On the surface they were killed by harpoons and axes. The hunters had a habit of inflating the

stomach of the dead shark before they threw it overboard after extracting the liver, which is the only valuable part. The object was to make the carcass float, since if it sank the sharks would devour it and neglect the fishermen's bait.

White-whaling was another occupation of the summer hunter. The whales were caught in the open sea by harpoons, but in later years there were shore fisheries in Icefjord, Bell Sound, Magdalena Bay, and elsewhere. Nets were used to collect the whales, which were dispatched with lances. Some forty years ago one vessel got a catch of 250 white whales in one summer, and this was not exceptional. This occupation, like the walrus and shark hunting, is now practically at an end. Other sloops sailed along the edge of the pack to the east of Spitsbergen: this occupation still continues.

A few parties of Norwegians wintered from time to time. As long ago as 1822 sixteen men spent the winter in Cross Bay, but they had poor luck, although strange to say all survived. The next year there were twenty-two winterers in Spitsbergen and nine in Bear Island. In 1825-26 all the winterers to the number of twenty-two in Green Harbour died of scurvy. After that wintering became comparatively rare until the beginning of this century. Then began the yearly inundation of Spitsbergen with Norwegian hunters. The game had had a long rest since the Russians abandoned the chase, and was very plentiful. The winterers trapped foxes and polar bears. Summer hunting was not at an end. Eider-down and eider-ducks' eggs were collected at such places as the Edin-

burgh Isles off Prince Charles Foreland and the Anser Islands in Icefjord. Reindeer hunting was profitable until a few years ago. One summer a few fishermen had indifferent luck in trying salmon fishing in the Russian Valley near Green Harbour.

Ten years ago there were probably not less than two hundred Norwegian trappers wintering in Spitsbergen : now there are less than half that number. Their huts were rude shanties, generally built of driftwood. They never had fine log-houses like the headquarters of the Russians. The larger huts house two or three men and the outlying huts one or two. The huts are to be found at various points along the west and north coasts : there are many in Icefjord. Often a grave or two alongside a hut tells the tale of scurvy due to unwise modes of living. The east coast was never much in favour, owing to the uncertainty of access on account of ice. The tale is told of how a party of hunters on the Wiche Islands got a rich haul of furs, but could not be reached for two summers by the relieving sloop. Rather than risk another year these men abandoned their spoils and, crossing the winter ice to the mainland, eventually reached the mining settlement in Advent Bay. Unlike the Russians the Norwegians do not keep their vessels with them during the winter. The Norwegian hunting sloop is fifty to sixty feet long and too heavy to be hauled up on the beach.

Excessive hunting soon began to tell on the numbers of game. The Norwegians then began to use poisoned bait to supplement more legitimate efforts. For a few years this method increased their

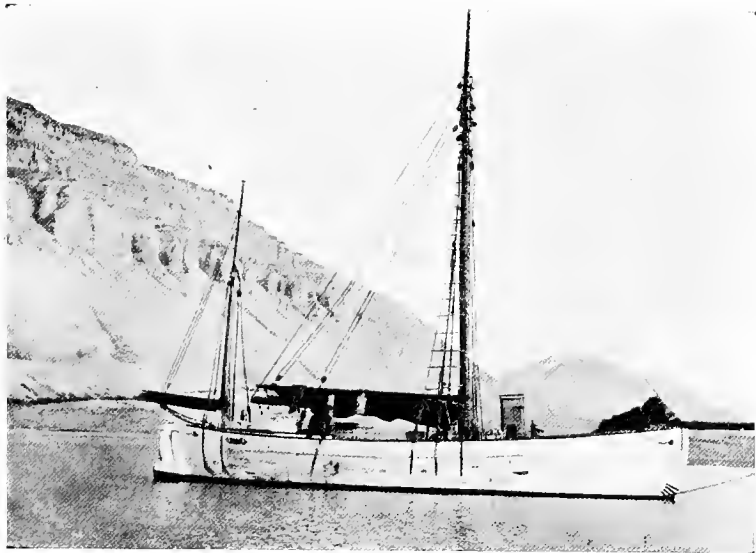
bag but eventually recoiled on its dastardly perpetrators. Poisoned beasts crawled into holes to die and were lost to the hunters. I have frequently found carcasses of white foxes among the rocks on some mountain side, where no hunter had thought to look for them. Birds as well fell a prey to the poison, and it is merely a matter of good luck that no hunter has died from drinking water from a stream contaminated by his own strychnine. The Norwegian Government tried to stop this practice by prohibiting the sale of strychnine, but the hunters laughed at the regulation and somehow or other contrived to secure a supply. Before long the game will be exhausted, except in the remoter parts. Then the hunters will leave Spitsbergen alone for a while till the soaring price of furs tempts them back when the supply has increased.

Before systematic wintering began the total annual value of Norwegian Arctic hunting was £10,000 to £16,000. These figures include all the Arctic produce obtained, but the greater part of it was from Spitsbergen and only a small part from Greenland, Jan Mayen, and elsewhere. Wintering doubled the value of the trade. In 1910 it reached its high-water mark of nearly £50,000 and dropped the next year to £37,000. Since then it has still further declined, although the high price of furs during the war must have given it an upward turn. Some idea of the hunters' bag may be gathered from the fact that in 1906 the thirty-one sloops which went to Spitsbergen from Tromsö—and most go from that port—took a total of 296 bears, 135 walrus, about 6000 seals of

various kinds, 136 white whales, 2888 reindeer, 1 narwhal, 61 blue foxes, 80 white foxes, and about 1000 lbs. of eider-down. Most of the sloops are now furnished with motors which, by making them less liable to be beset in the pack, promote economy in the voyage.

The construction of a hut however primitive takes some time, so quite naturally the houses built by explorers and miners in various parts attract the hunters. Miners' huts are often unoccupied by the owners during the winter, and explorers' winter quarters are left untenanted for long periods, if not altogether abandoned. While it is reasonable enough for hunters to make use of well-built empty houses, there is no excuse for the disgraceful way in which they treat them. Some huts on Prince Charles Foreland were quite uninhabitable after one winter's tenancy by a band of Norwegians. A boat left beside the hut and clearly marked with the owner's name was stolen. Several years later it turned up in another part of Spitsbergen and was found by the rightful owner lying abandoned on the beach.

The Swedish house at Cape Thordsen was the scene of a tragedy some years ago. Six walrus sloops were caught in the ice off the north coast. The only hope of adequate supplies was at the Swedish house which the crews safely reached after a long boat journey. Here the men lived in riotous luxury, but not for long. Ample stores gave them no inducement to go afield for game. They lived on salt beef and pork, not even troubling to use the potatoes and dried vegetables they found. Want of fresh food and lack



SEALING SLOOP.

This sloop served as a Norwegian post-boat between Tromsö and Green Harbour for several summers.



A HUNTER'S HUT.

Note the primitive nature of the hut and how it is built in a cleft of rocks in order to save timber and to gain strength.



of exercise soon led to scurvy. One by one they were attacked and died. Next summer seventeen bodies were found ; some of those who died first had been decently buried, others had been thrown out scarcely covered with soil : the last survivors were lying dead in the house. A large grave near the house now records the fate of these seventeen men. This tragedy lies at the root of the legend which one used to hear in Spitsbergen that the house was haunted. The gloom of the swampy valley in which it stands, and the air of dejection which the mouldering house exhibits, no doubt enhanced the tale. But some years ago, when I camped in the vicinity and examined the house, it was quite clear that one of the rooms had been inhabited the previous winter. Remains of skins, bones, bits of clothing, and general dirtiness spoke of a hunter's winter quarters.

At a later date the house was associated with another marooned party, but with less tragic results. A Tromsø skipper, Klaus Thue, and three other men, including a Lapp, were wrecked off Advent Point. With the remains of their sloop they constructed a hut half-sunk in the ground for the sake of warmth. There they stayed until the fjord froze over, when they crossed to Cape Thordsen, with the intention of finding more comfortable quarters. One of them was already very ill with scurvy. He was left at the Swedish house when the other three men returned to Advent Point in a fortnight's time for provisions. When they returned he was still alive, and once more they left him to go and seek food. They reached Advent Point after killing several bears, but this

time open water prevented their return. Soon after the skipper died of scurvy, and the two survivors made their way by boat to Bell Sound, where they were rescued. The man who was left to die at the Swedish house was never seen again. Either he wandered and was lost or was carried off by a bear. Klaus Thue used often to return to Advent Point in the summer. He pitched a tent and drove a trade in skins and fossils with the tourists who were then beginning to reach Spitsbergen.

Pages could be filled with tales of the adventures of these hardy men. Rough and lawless they may be, but they are certainly fearless and resourceful. At an age when other men might think of retiring these hunters have still been known to frequent Spitsbergen. James Lamont had a man of over sixty with him on his hunting expedition, and Torell once took an ice-pilot of seventy years of age. The veteran Mattilas, who had hunted in Arctic Seas for forty-two summers, was nearly seventy years old when he died during his spartan wintering at Grey Hook in 1872.

There are records of voyages in open boats as far as Norway, for the Norseman is nothing if not a sailor. An old hunter, who used to frequent Spitsbergen summer after summer to shoot reindeer, always did the journey from Norway and back again alone in an open boat. The tale is told of two hunters who left Vardö in an open boat for Spitsbergen. Encountering terrible weather it was thirteen days before they reached Storfjord. Thence they sailed round to the west coast, and hunting reindeer filled

up their boat with venison and the blubber from a dead whale they secured. Returning to Norway they got within five miles of the North Cape, when they were driven back to Green Harbour by a heavy gale. Before the boat was repaired and its cargo re-stowed ice prevented them leaving and they were forced to winter. They made for Middle Hook in Lowe Sound, where they knew there was a hut, and reached there in safety, but with no food except one reindeer calf. They had a gun and powder but no ball cartridge and no matches. Bullets were made out of driftwood and with this strange ammunition the two men contrived to shoot enough reindeer to keep them alive throughout the winter. They hunted daily, and the ample exercise and fresh meat kept them in good health. In summer they returned to their boat in Green Harbour, and setting sail reached Norway without further mishap.

In 1864 three sloops benefited by the open water skirted North-East Land and rounded its eastern cape. With full cargoes they attempted to return but were beset in the pack-ice. The connection of Heley Strait with Storfjord was not known in those days, so the crews decided to travel by Hinlopen Strait and the north coast. They started off in seven boats, and after many adventures at length reached Icefjord where they met a Swedish expedition which gave them a passage to Norway. The three sloops abandoned with £3000 worth of skins and walrus ivory aboard were never heard of again. Perhaps the first inland journeys in Spitsbergen were made by Norwegian hunters. Certainly a small party of them

made the first crossing of west Spitsbergen in 1890, travelling overland from the Norway Islands to Cross Bay, but there is no record of the route they followed.

On one occasion three men intending to winter on Prince Charles Foreland were wrecked at the mouth of Icefjord. They got ashore in the vicinity of Alk Point, saving little but their guns, ammunition, and matches. After constructing a hut of stones and peat they set out along the shore to Cape Boheman, a distance of some twelve miles, to seek for fuel in the coal beds. They succeeded in getting about a hundredweight, which they laboriously carried back to their hut. The winter was cold and cheerless, but a little game came their way. In spring two of them set out for Green Harbour in their boat, which they had managed to patch up with driftwood and canvas : the third remained to guard the store of skins, for being hunters they knew the habits of their kind. In Green Harbour the two men found another boat in which they went hunting along the coast as far as Bell Sound. Ultimately all were rescued and returned safely to Norway. Their winter of hardship and exposure brought each of them only about £100 profit.

Many adventures have had more tragic endings. The experiences of Paul Björvik are an example of what these men can endure. This man had spent his life in polar seas and had made at least one visit to the Antarctic. He was not a young man when he went to winter in Franz Josef Land with a single companion, a man who had sailed in the

Fram with Nansen. His comrade was attacked by scurvy and died after great suffering. For seven months Björvik lived alone with the dead man, the ground being frozen too hard to bury him. Men have gone insane under such circumstances, but this rough seaman kept his mental balance: he sang to keep himself company, and when his voice sounded eerie, as the human voice can in such solitude, he wrote his journal. Next summer the relieving sloop found him well and happy. Ten years later Björvik had a similar experience. With one companion named Johnsen he was left in charge of Wellman's sledge dogs at Danes Island. The winter was nearly over when Johnsen was lost through the ice on a hunting expedition. "It is now the second time I've seen a good comrade die in the Arctic, but this seems even worse than when Bentson died in Franz Josef Land." "But I must pull myself together. . . . I must find something to do or else I will not be able to hold out. . . . I can't write any more, I can only sit by the signal post and wait for the ship." Again Björvik survived the ordeal and was safely rescued.

Bear Island has had its share of adventures. It was the scene of some of the earliest Norwegian winterings, and several of the huts are still to be seen. One came in useful in the winter of 1852-3 when it sheltered the crew of a Norwegian sloop which, having lost its mast on the coast of Norway, drifted north and went ashore in Russe Harbour. The crew are said to have been ignorant of their whereabouts until rescued next summer by a Hammerfest sealing schooner. At a much later date another shipwrecked

crew found safety in Bear Island. A timber vessel from Arkhangel losing her way ran on to the island in winter darkness, but luckily some Norwegian miners were wintering that year and were able to help the shipwrecked men ashore. This forbidding, mist-wreathed island may have given the death-blow to many another vessel and suffered no survivors to tell the tale.

The rank and file of the Norwegian winterers if hardly as illiterate as the Russians certainly have added no more to our knowledge of the country. But many of the skippers of the hunting sloops have proved enterprising and enlightened explorers, though, unfortunately, their reports as a rule are vague and lack precise details of position. One especially has earned a place on the roll of explorers: that is Elling Carlsen, who in 1863, in his sloop *Jan Mayen* made the first authentic circumnavigation of Spitsbergen, sailing from north to south. In recognition of this feat Carlsen was presented with a gold watch by the Royal Geographical Society of London. This was the man who in 1871 discovered the ruins of Barents' winter quarters in Novaya Zemlya, and so solved a mystery of nearly three centuries' standing.

Other notable Norwegian skippers were Rönnbäk, who circumnavigated west Spitsbergen in 1867; Erik Ulve, who helped Leigh Smith in his important exploration in 1871, and S. Tobiesen, J. Altmann, J. Nilsen, Nils Johnsen, H. Andreasen, and others, whom we will have occasion to mention later in connection with the Wiche Islands. One hunter did useful

scientific work : Martin Ekroll wintered in 1894-95 in Habenicht Bay on the east side of Storfjord, and took the only series of weather observations ever obtained from that region. He made a chart of a small haven which is now named in his honour.

IX

TRAVELS IN SPITSBERGEN

THE traveller in Spitsbergen has fewer difficulties to face than in most polar lands.

Desolate as the country may look at first sight, it nevertheless offers a number of resources to the experienced explorer. It is true that the game has been sadly reduced in recent years, but reindeer can still be found in certain favoured localities. Bird-life, however, is plentiful and supplies good food for those who are not too fastidious to eat guillemots, puffins, and other sea-birds. But as the traveller is usually provided with his supply of stores, food is a less valuable resource than fuel, of which many coasts of Spitsbergen offer an abundance in the form of drift-wood. Before hunters began to frequent the country and use this wood for fuel the amount must have been enormous. Now the beaches are being stripped quicker than the current replenishes them, but there is still abundance to serve the traveller with fuel and even building timber. Up the fjords and away from the coasts there is no fuel, unless one climbs a hillside and picks at a coal seam. Moss burns badly, and the low-growing willows have too little wood in them to feed a fire.

For reasons of food and fuel it is always advisable

to travel along the coast. And generally such a route is far easier than an apparent short cut across the interior. Difficulty occurs in passing glacier faces. Their seaward ends are generally so broken as to be quite impassable. A long detour inland has to be made. Occasionally a river makes a formidable obstacle, not so much by reason of its depth but owing to the deep, glutinous mud in its bed and the treacherous swamps on either side. One can become more or less hardened to wading deep, ice-cold rivers, but one never gets reconciled to sticking fast in the glacial mud. One other drawback to lowland traveling in Spitsbergen may be mentioned. That is the state of ground so aptly described as "road metal." In places there are tumbled masses of sub-angular boulders of all sizes, from several feet to only a few inches in diameter. The coarser boulders are wearisome to cross as one has to jump from point to point and risk a sprained ankle or a broken leg. But the smaller "metal" entails the greater hardship. Boots, sodden with tramping through swamps and peat-bogs and wading rivers, are soon cut to pieces on the hard, angular rocks: every step makes one curse the country. Little wonder that three weeks is the span of life for a pair of boots in Spitsbergen.

Transport under these conditions is a perplexing problem. Sir Martin Conway tried ponies, but they sank up to their bellies in the yielding ground. Man-hauled sledges work well enough on the peat-bogs, but are broken to bits on the rough ground. In Prince Charles Foreland we used very effectively a low cart with two large broad wheels, devised by

Dr. W. S. Bruce after extensive acquaintance with the work to be faced. This contrivance worked fairly well and on the whole is to be recommended. However, in the long run there is nothing so serviceable as human transport. Cut down the gear to a minimum and carry it on your back and progress will be slow but satisfactory.

A traveller who knows the nature of the country will pick his ground carefully. In the broad valleys, such as Sassendal and Adventdal, good firm ground can be found on the banks of river gravel below the mountains, at a time when the bottom of the valley is quite impassable. These banks give good going and the route avoids the wide stony fans of the tributaries, even if it necessitates crossing some deep ravines.

Winter is probably the best season for travelling, as far as surface conditions go. The darkness is a drawback, but not an insuperable one in a relatively well-charted country. The cold, on the other hand, is probably an advantage as it removes the obstacles of rivers and swamps and allows the traveller to keep dry in his fur sleeping-sack. Early summer, May and June, with their endless daylight, is a tempting season to get on the move, but a better season to stay at home. The snow has not yet melted but is too soft to bear ski and sledges, the swamps are gorged with water and the rivers are in flood. It is far better to wait until July, when the snow has gone and the floods are over. But August, with its occasional night frosts, is the best month of all. The ground is drier and the rivers at their lowest level, while there

is still no real darkness to impede progress by night. I marched many miles through the interior of Spitsbergen one August, and despite having to wade a score or more of rivers never met with any real obstacle. The widest river was crossed in the early hours of the morning, when the night frost had reduced its depth by drying the tributaries.

On high ground, of course, the conditions are different. Midsummer is a bad season for travelling. The snow is soft and the glaciers are cut by rushing torrents. To get a foothold on their surfaces is difficult. In winter and early summer the ski grip well and the way is open in all directions. Major Isachsen, who has had many summers' experience in the interior of Spitsbergen, used sledges for transport. The sledges, which were about 7 feet long, had steel-shod runners for ice, which could be replaced by wooden runners on snow and by broad wheels on bare ground. Thus equipped he found he was prepared for any type of surface he encountered.

The sea, however, is the great highway in Spitsbergen. It is the great branching fjords that make access easy to any part of the country. No doubt if Spitsbergen had been a more compact land with a shorter and less interesting coast-line the exploration of its interior would not have been so long delayed. As it was the sheltered fjords and the long coast-line absorbed attention until recent years.

To anyone not conversant with Spitsbergen the idea of camp life so near the North Pole suggests all manner of hardships and discomforts. In reality there is no pleasanter way of spending a summer for

a person in normal health. Certainly there are difficulties to face at times. Bad weather is frequent but at its worst never feels so unpleasant as a wet winter day in London: food may occasionally run short for a few days, but a hungry man finds many things edible that he would scorn in civilization: physical fatigue never becomes weariness of limb and mind and one is never troubled by sleeplessness.

A great deal depends on the site of the camp. A base camp will probably be within a few yards of a good landing-place for convenience of transport. A soft, mossy site is tempting, but care must be taken that the luxuriance of the moss growth is not due to a trickling stream from some melting glacier or snow-field. Fresh water should be as near as possible. Of course such ideal conditions are not always obtainable: but a bed of fine gravel makes a fine camping-place and in the interior snow is not to be despised provided the temperature is low enough for it to remain frozen, despite the heat of the body. Sometimes it is almost impossible to find a good site. In one place where we were forced to camp the sea cliffs rose sheer to fifty or sixty feet from a narrow beach covered at high tide. From the top of the cliffs swampy moorland and peat-bog stretched a mile or two back to the mountain-slopes. The only solution of the difficulty was to cut a platform, propped up with barks of driftwood, on the side of a ravine that cut through the plateau to the sea. There, perched between the peat-bogs above and a roaring stream below, we pitched our tent and found ample accommodation for four men and all their gear.

Many kinds of tent have been employed: every explorer has his particular build, which he thinks preferable to all others. The conditions allow wide latitude in choice. In summer driving snow is rare except at high altitudes and the fine powdery snow, which is the curse of the Antarctic explorer's life, does not occur, so that no particular precaution need be taken as regards ventilation. Yet it certainly adds to the comfort of the camper, and often saves his tent from being lifted, to have footflaps to the sides which can be turned outwards and piled with stones or boxes of stores. For a base camp a roomy bell tent is very serviceable, but for travelling something far lighter and more compact is essential. The maximum of space and the minimum of weight combined with rigidity is afforded by a pyramid-shaped tent of light Willesden canvas, with four bamboo rods meeting at the apex in an aluminium socket. This dispenses with a centre pole—a fruitful source of annoyance, and more important still can be fixed without the use of guy ropes, which are often a problem when the ground is too hard and stony for tent-pegs.

After all it must be remembered that a tent is used only to protect the sleeper from the wind or the driving mist or occasional rain: it is seldom required for any other purpose. Meals are taken in greater comfort in the open, especially if there is a camp-fire. It is needless to emphasize the value of the camp-fire in promoting the physical and social welfare of the camp. But picturesque as it is, such a fire is wasteful of fuel and not convenient for cooking. A stone camp oven is easily built and more useful. Flat stones

are piled up on three sides of a space about two feet square to a height of about a foot: against these stones shingle is banked to make the walls secure. Two or more large flat stones are placed across the top, leaving enough space between for the flames to reach a kettle or pan. Such an oven can be built in an hour with variations in its architecture dependent on the building material and the supply of fuel available.

The choice of stores and the relative value of different kinds of food are largely matters of national temperament and prejudice. In all my Spitsbergen experience, as well as in south polar journeys, we relied on oatmeal as our principal food. It is easily carried, readily cooked, and very nutritive and warming. Tinned milk when available was used with the porridge. Next in importance to oatmeal comes bacon: the kind with plenty of fat is best in polar regions. Butter, cheese, "hard tack," sugar, tea, coffee, and cocoa—these about complete the list of stores. Tinned meats may be useful, but they are unpalatable and are better avoided, though Scandinavians seem to thrive on tinned fish. Fresh food is plentiful on almost any coast in summer and supplies can always be laid in by a trip to the nearest loomery, if reindeer are too elusive, as they tend to be nowadays. Ducks and geese are very numerous, but they take time to shoot as they are very wary, and the geese fly high. Sometimes the goslings are fairly easy to capture. Ptarmigan are often to be found. Lastly, the much debated question of alcohol remains. There may be occasions when it would be useful, certainly

there are occasions when it would be acceptable, for a polar thirst is like no other and far more intense than a Saharan thirst, but one can get on very well without alcohol and never really misses it. Since it has no food value it is in the nature of an impediment to the explorer and is better omitted from his stores.

There used to be a time, not so many years ago, when the great plague of the explorer's life were the foxes, which at night would raid his camp and steal his stores. Now there is little fear of that, at least on the west coast and in central Spitsbergen, where foxes are rare. The chance of a bear attacking a summer camp is negligible except in the east.

As to clothes there is little to say. The ordinary clothes of civilization, with a suit of windproof overalls and a wide-brimmed hat, are all that are required. Boots, however, cannot be too carefully chosen or too strong. Fur-sacks are useful for sleeping, and care must be taken to keep them dry.

X

AN INLAND JOURNEY

A JOURNEY which Dr. W. S. Bruce and I were unexpectedly forced to make one summer illustrates most of the difficulties of travel in Spitsbergen. We had been encamped alone for several days at Bjona Haven, the beautiful little natural harbour in Sassen Bay at the foot of Temple Mountain. A Norwegian tourist steamer had arranged to call for us one Sunday in August in the course of her cruise along the coast. Ice conditions were bad that summer and there were streams of pack-ice even in Icefjord. By Sunday evening there was no sign of the *Kong Harald*. Climbing to the highest point in the vicinity, we saw a great mass of pack down the fjord. Still, pack may move quickly, and there was hope of an open channel the next day. However, Monday passed without any improvement in the conditions, and it was quite clear to both of us that if we hoped to escape we must depend on our own efforts. The *Kong Harald* might have sunk and possibly no one was aware of our plight. In any case we expected no one to be in a position to help us. To winter was out of the question, as we had only summer clothing and a few provisions: we must retreat to one of the mining camps from which we could

certainly get a passage home up to the end of September or even in October. The nearest camp was the American one in Advent Bay, where most ships in Spitsbergen waters called.

From Bjona Haven to Longyear City by sea is a distance of about thirty miles. With a fair wind, on which we could by no means rely, the voyage could be done in eight hours, and with allowance for delays in twelve. We had two boats, one a rather battered ship's dinghy of very heavy build which had seen a great deal of service in Spitsbergen and was sadly in need of repair; the other a light Norwegian *pram*, a keelless boat not fit for sailing and not seaworthy in heavy weather. We decided on the dinghy and devoted two days to preparing her for sea. This entailed caulking the seams as best we could, making a mast from an oar, fashioning a sail from the floor-cloth of the tent, and adding the necessary rigging. The greatest difficulty was to ship the rudder, for the pintles were broken. With considerable ingenuity Bruce made new ones out of some wonderful 8-inch nails which for some unfathomable reason he had included in our gear. With great trouble we hauled the heavy boat a hundred yards across the loose shingle and launched her in the harbour. Here we meant to wait until we got a fair wind down the fjord, for by this time there seemed to be no ice on our side of Advent Bay. But our efforts were in vain. The boat leaked in half a dozen places so seriously that no amount of baling could keep her afloat. We had to haul her up on the beach again and consider a new plan.

To reach Advent Bay by land would entail many difficulties, of which the most formidable were the traverse of the great Post Glacier, a tumbled chaotic mass of ice-blocks, and the crossing of the deep, muddy Sassen River, with its swampy, treacherous borders. This route was clearly out of the question, except as a last resort: it would not be practicable before hard frost set in. There remained the light Norwegian *pram*. She was small and could not sail, and had room only for the two of us and a small quantity of stores. The weather was favourable, and we had already struck our camp and packed up. Any further delay would only increase the disappointment we felt on our dinghy failing us. We hurriedly chose a few stores, a light tent, a rifle, and some ammunition, and abandoning the remainder of our equipment, put to sea.

With two pairs of oars, although we had not enough room to pull full strokes, we made good progress and were quickly out of Bjona Haven into Sassen Bay. But we began to rejoice too soon. The calm was broken by a westerly air which rapidly increased in strength. The rising wind, blowing up the whole length of Icefjord, soon raised more sea than was comfortable for the light boat. We shipped water every moment and had to divide our labour, one man rowing and the other baling. It was difficult to make any headway: wind and sea were driving the boat to leeward and it looked as if we might drift down and strand in the shallow water at the mouth of the Sassen River. If we managed to keep clear of that our fate would be to be driven against some

heavy pack stranded on the southern shores of Sassen Bay. In either case there was little hope for the frail boat. By dint of great efforts we managed to make some progress and got into smoother water under the lee of the land. There was no hope of continuing our voyage as long as the gale lasted, so taking advantage of a gap between two stranded floes we turned the boat shorewards and jumping out in shallow water ran her up on the beach.

It was now about eight in the morning: we had taken eight hours to row some twelve miles. Bruce, tireless as usual, set out to shoot a duck as soon as we had set up our tent on a fine dry spot. Meanwhile I collected enough driftwood to make a roaring camp-fire. We were in the vicinity of Windy Point, a sandy spit of deltaic formation at the foot of Mount Marmier. Near by we identified the sites of previous camps of Baron de Geer and Sir Martin Conway. After a good meal we turned in and had a glorious sleep of about twenty hours. When we woke the gale was still blowing but the weather was fine. To continue our journey by sea was out of the question, so we decided to abandon the boat, tent, and most of the stores, and to make a forced march to Longyear City. There was no doubt a possible route round the coast, but from what we knew of the way it promised bad walking. On the other hand, the route by de Geer Valley to Adventdal, as far as we could judge by Conway's map, was not likely to be very difficult. The route had not been surveyed and possibly not traversed by any explorer, but there was no likelihood of glaciers being encountered.

Our luggage consisted of an aluminium cooking pot, a few pounds of oatmeal, a little chocolate, fifty feet of alpine rope, an ice-axe, a rifle, and a dozen rounds of ball cartridge—the last in case we were lucky enough to find a reindeer: the possibility of a bear was remote. Sleeping-bags had to be abandoned. About noon on Saturday we set out, and feeling very fit found the way easy enough at first, in spite of the rough ground. After a few miles we reached the mouth of de Geer Valley, and came on a rough hunter's hut. It was uninhabited and contained nothing of interest. Probably it was an out-station of some hunter's winter station further along the coast. One or two of the usual derelict claim boards were the only other signs of man. Climbing a low cliff at the mouth of the valley, over which the stream falls in a pretty waterfall, we began a slow, steady ascent. The higher ground on the valley side was fairly dry, but we had many deep cañons to cross. Several contained deep streams, but we had learnt to cross these without mishap.

Hour after hour we plodded on, across the rough ground varied with stretches of bog, scrambling down ravines, fording streams, and climbing the steep slopes. Across the valley to the west a grand panorama of peaks and hanging glaciers unfolded itself: behind us Icefjord was gradually being lost to view. Higher up, as the valley narrowed, the best route was along the bed of the stream, and the way became very soft and arduous as we reached the watershed, and looking down on the valley leading to Adventdal it was a great relief to feel that our

climbing was over—we were at 800 feet—and that no glacier had to be crossed. The descent to Adventdal was rough, but our progress was quickened by the sight of a large wooden hut ahead of us. By this time we were hungry and footsore, but without fuel it was useless to halt. A rest would not appease our hunger and would only make us cold and stiff.

It was now after 10 o'clock at night but quite light, and the hut looked tantalizingly near. Yet we had two hours' march before reaching it, and a wide river with a terribly stony bed to cross. Where a big tributary enters the Advent River in the middle of a wide river plain strewn with boulders, rises a curious hill, known as Jansen Hill. On its top stood the hut. It was uninhabited, and, as we learnt from a sign-board, belonged to the Sheffield company that several years before had opened a coal mine at Advent Point. This was one of the places where the miners had been prospecting nodules of iron-stone. Entering through a window we found the hut in good condition. There was a large living-room with a good stove and several bunks. Adjoining was a small pantry or storehouse, and at the back of the house was a stable with stalls for two ponies. There was coal enough to make a good fire, and we soon had a meal of porridge, which we enjoyed all the more by the lucky find of a tin of condensed milk. It was delicious to sit in shelter by the warmth of the fire and get thoroughly dry. We were tempted to have a sleep, but our store of food was too small to allow delay in reaching Longyear City. So, very reluctantly, we set out again about 2 a.m., descending the northern side of Adventdal.

The valley between us and Advent Bay took a great sweep, so that by keeping on the northern side we hoped to decrease the length of our march, and also to avoid fording the deep river, a not unimportant consideration after we had succeeded in getting dry. On arrival at Advent Bay we foresaw no difficulty in signalling across to Longyear City for a boat to come and fetch us. Except for a few stony alluvial fans the way was fairly easy, but an hour's fall of soft snow was a nuisance, chiefly because it made a choice of route difficult by veiling the surface. After four hours' march we came on another hut like the one we had left. The temptation to have a rest was great, but we pushed on and soon came in sight of the sea. The whole landscape was snow-clad and the bay was dotted with floating ice. For a moment we failed to recognize Advent Bay, and wondered if we could possibly have missed our way and reached some other part of Icefjord. But that was impossible: the map we had with us was certainly crude in parts and incomplete, but there was no place for a new valley like Adventdal. It was merely the covering of snow that disguised a view we both knew well: we were right enough near the head of Advent Bay and, as we fondly imagined, near our journey's end. By 8 a.m. on a fine calm morning we were opposite the American camp.

The strong sun had melted the night's snow and, in the clear atmosphere, it was hard to believe that the settlement was fully three miles across the water. Rifle shots, shouts, and two huge bonfires all failed to attract any attention. It was Sunday morning

and few people were astir. As ill-luck would have it there were no steamers in the bay and so no boats available. Our failure was a little disappointing as our food was practically finished and we were a little tired of tramping through Spitsbergen. However, we decided to go four miles further along the bay to the deserted Advent City. We might possibly find some food there or by great good luck a boat. The beach of Advent Bay is rough walking: coarse angular shingle is about as bad a surface as can be imagined when one's boots are sodden to a state of pulp. But at length the huts and tramway of the mining camp came into view.

Another disappointment was in store for us. Not only was the city lifeless but it had quite evidently been looted and virtually destroyed. Only the log-houses remained standing: their doors and windows were smashed: their roofs in many cases stripped. We searched vainly for something to eat and our failure to find anything was aggravated by the signs of wanton destruction of food. One storehouse was ankle-deep in broken jars and smashed bins; another had an inch layer of treacle over the floor, on which were scattered smashed crockery, tools, nails, etc. Bruce and I worked systematically through this wilderness for an hour, and then met to compare notes. Bruce had found a little very stale rye-bread and a small packet of tea: my contribution was a tin of treacle. We set a fire going in a stove the raiders had failed to destroy, and soon were enjoying our meal. The weather was warm and sunny, but Icefjord and Advent Bay showed no signs of ships,

and, as we found no boat of serviceable character, there was nothing for it but to trudge back, cross the Advent River at its lowest fordable point, and reach Longyear City on foot.

We had little hope that signal fires would be of more avail than in the morning, but meaning to give them one more trial we carried with us on our return two buckets of pitch. They proved terribly heavy before we reached the head of the bay and more than once we were inclined to abandon them. Eventually we reached the site of our morning fires and soon had dense volumes of black smoke befouling the bay, but to no avail. No boat set out and no answering signal was made. As we learnt later, our fires were taken for the pranks of riotous hunters. So we started to retrace our steps up Adventdal. Like the Sassendal, this valley is very swampy and treacherous in its lower parts. The river also is fairly deep. It promised merely to waste time and energy to attempt to cross it for several miles from its mouth, and having to go so far we decided to revisit the friendly hut of the night before in order to have a short rest.

Marching was now an arduous task, for we were very footsore, and hunger was beginning to tell. However, we had good weather, and finding an easier route than in the morning were back at Jansen Hill about midnight. The hut gave us welcome shelter and warmth, but could not appease our hunger, so our stay was short; but we took care to provide ourselves with a bottle full of black tea, made from the remains of the packet we had found at Advent City. Luckily a night frost had set in and



TWO NOTED POLAR EXPLORERS, ADVENT BAY, 1912.

Dr. W. S. Bruce (on right), Dr. F. Nansen (in centre), Dr. Nansen's son (on left). Dr. Nansen is carrying the camera he used on all his Arctic explorations.

dried up some of the source streams of the river, so we had little difficulty in crossing, but we took the precaution of doing so barefooted in order to keep our boots dry and hard as long as possible.

The south side of Adventdal is much rougher than the north. Huge alluvial fans from the mountain streams practically meet one another from Jansen Hill to the sea, affording the worst possible surface for marching. We got along slowly: in a few hours every step was a torture, for our boots were worn through and our feet cut and torn. We almost fell asleep as we walked, despite frequent nips at the bottle of black tea. But one consolation was that we knew we were on the right road. The distance to food was measured and no mishap could increase it. Hour after hour we plodded on, Bruce much fresher than I was and quite possibly enjoying himself in spite of his hunger. At length, approaching Longyear Valley, we halted to patch up our boots and to give ourselves as respectable an appearance as possible. The last lap we did in great style and managed to walk into Longyear City, with little outward sign of weariness, about 10 a.m. on Monday morning. We had covered about seventy miles in forty-six hours, including halts.

The Americans received us hospitably. They had heard that the *Kong Harald* could not reach us, but had not worried, having enough belief in Bruce's resource and knowledge of Spitsbergen to feel confident that, although marooned, we would manage to escape safely. In a few hours we had chartered a hunting sloop, recently arrived in the bay, to sail back

to Windy Point and Bjona Haven to fetch our abandoned gear. By evening we were back in Advent Bay, when we found that Dr. Fridtjof Nansen had arrived in his schooner, *Veslemøy*. Nansen had been engaged in oceanographical research on the north-west coast when he got news of our plight and had hurried south to see if he could be of assistance. He had looked in at Advent Bay to see if there was any news of us when we found him. The evening was pleasantly spent in the snug cabin of the *Veslemøy*. How we kept awake I do not know, but it was early morning before we turned in on the collier which was to take us to Norway, having carefully instructed the steward to call us as soon as any food was going. The next day we sailed for Tromsö under the American flag.

XI

THE BEGINNING OF SCIENTIFIC EXPLORATION

IT is difficult to say at what period in the history of north polar exploration the quest for a short route to India and Cathay ceased to have influence. This quest was certainly the motive that began polar voyages and for many centuries accounted for their continuance. Its influence remained long after it had ceased to find advocacy as the main objective of polar exploration. Until it had been proved that the North Pole was inaccessible in open water there was no reason to abandon hope of this short cut to the East being opened to commerce. Several expeditions, the main object of which was to reach the North Pole if not the Pacific, made Spitsbergen their base, and so merit some notice in these pages.

The first of these was one dispatched by the British Government in 1773 under the command of Captain The Hon. J. C. Phipps, afterwards Lord Mulgrave. The ships selected were two sturdy vessels built for bombing in siege operations, H.M.S. *Racehorse* (Captain Phipps) and H.M.S. *Carcass* (Captain S. Lutwidge). Perhaps one of the most interesting facts connected with this expedition is that one of the midshipmen on the *Carcass* was

Horatio Nelson. The ships reached lat. $80^{\circ} 36' N.$ on the north-west of Spitsbergen and then turned back and anchored beside Vogelsang, where the expedition made a bad and valueless chart of the neighbourhood. Another attempt to get north was little more successful. Beyond adding something to our knowledge of the Seven Islands, and making some natural history observations, the expedition was largely a failure. In one respect it was nearly a disaster, for young Nelson had an encounter with a large bear who might have got the better of him had not Captain Lutwidge seeing the danger had a gun fired, which was successful in frightening it away. So our future admiral was saved.

Disappointing as this expedition was, it was repeated in 1818 by the British Government. Reports of favourable ice conditions in the north led that year to the dispatch of an expedition under Captain D. Buchan in H.M.S. *Dorothea*, with Lieutenant J. Franklin in H.M.S. *Trent*. The expedition made its first mistake in sailing too early: by the end of May it had reached Magdalena Bay and could do nothing on account of pack-ice. It re-surveyed the waters now called Fairhaven, which Phipps had done so badly forty-five years before, and explored the neighbourhood. Putting to sea the expedition with difficulty reached lat. $80^{\circ} 34' N.$, a lower latitude than Phipps had attained. There the *Dorothea* was so badly crushed that Captain Buchan decided to abandon the expedition and return home.

Both these expeditions undoubtedly had bad luck

in missing open seasons. There are years in which the north of Spitsbergen is open to a far higher latitude than about $80^{\circ} 30' N$. A tourist steamer has even reached lat. $81^{\circ} 40' N$. Sir Martin Conway has unearthed an interesting MS. Register Book of the Royal Society, dated 1662, in which among some notes on the Greenland fishery it is stated that a Hollander "swore he had been but halfe a degree from the Pole," "which was also attested by his mate." This is improbable, but it would be rash to insist that it is impossible; for polar pack-ice shows strange vagaries at times.

In any case the next expedition sent to the north of Spitsbergen, again an enterprise of the British Government, did not include a high latitude among its aims. Sir Edward Sabine's expedition of 1823, in H.M.S. *Griper*, went to the Fairhaven, in the Norway Islands, to make pendulum and magnetic observations. His was the first expedition to Spitsbergen with purely scientific aims unmixed with adventurous or commercial enterprise. Clavering, captain of the *Griper*, seems to have been sorely tempted to try his luck where Buchan and Phipps had failed, but ice conditions were as unfavourable as his predecessors had found them. This expedition, we will see later, had fruitful results although its duration was short.

Four years later, in 1827, another attempt was made to reach the Pole by the Spitsbergen route, but Sir Edward Parry, who was in command, seems to have decided that progress must be made, not by the ship, but by sledges over the sea-ice. Parry was

already an experienced Arctic explorer, having commanded H.M.S. *Hecla*, the vessel of his new expedition, on two voyages, and H.M.S. *Fury* on one voyage to the Canadian Arctic regions. Among his companions in Spitsbergen were James Clark Ross and F. R. M. Crozier, who a few years later commanded the *Erebus* and the *Terror* respectively on their great Antarctic voyage. Captain F. R. M. Crozier subsequently accompanied Sir John Franklin in command of the *Terror* in his fateful search for a north-west passage.

The *Hecla* started early in the season; caught in the ice near Hakluyts Headland, she drifted towards the east. However, she got clear, and, after much search for a harbour about the Seven Islands and elsewhere, eventually found one in Treurenberg Bay, which had been known to the Dutch whalers. In Hecla Cove, on the east side of the bay, the ship was anchored. Parry lost no time in leaving for the north on a sledge journey. Going via Walden and Little Table Islands in boats the party took to the ice in about lat. $81^{\circ} 13' N.$ on midsummer day. Their progress was slow and difficult: the ice was hummocky and very often soft: fogs were frequent and there was much rain. Before long they made the unpleasant discovery that the ice across which they were travelling was drifting south. Under these circumstances the attainment of their objective was hopeless: after a month's battling with these difficulties they reluctantly turned back. At his furthest north, lat. $82^{\circ} 43' N.$, Parry was about 170 miles from the *Hecla* and had travelled 100 miles by boat

and nearly 200 miles on the ice. The expedition surveyed Treurenberg Bay and part of Hinlopen Strait, and did much geological work. One cannot read without envy of the numbers of reindeer these explorers saw. They speak of many herds of ten or twenty, and record they killed seventy deer.

Sir Edward Parry's expedition closes the record of expeditions to Spitsbergen aided by the British Government. His failure to push northward confirmed the opinion already strongly held that the route to the Pole was not via Spitsbergen. Yet many years later Parry changed his opinion on this point, and his reborn belief in the possibility of gaining a high latitude by this route found supporters in Sweden. The efforts of the Swedes will be described among the later scientific expeditions.

Certain other expeditions of a more strictly scientific nature remain to be noticed in this period of Spitsbergen's history. Pole hunting is a great adventure—perhaps the finest on earth—and in those days, when so little was known of polar regions, it had some geographical value in so far as it scored new trails across the unknown. The British Government has not shown lack of interest in this type of enterprise, but its appreciation of purely scientific research, whether in cartography, geology, biology, or meteorology has never been very marked. This explains why from this time onward the British Government gave little help or even encouragement to Spitsbergen exploration.

William Scoresby was a Whitby whaler brought

up in a profession in which his father had excelled before him. Never neglecting the commercial side of his profession, he always took a great interest in its scientific aspects and in the geography and natural history of Arctic regions in general. Whaling has from time to time produced men of this type: in later days there were the Grays, of Peterhead, and T. Robertson, who skippered Dundee whalers for many years. William Scoresby landed in Spitsbergen on more than one occasion, the first time being at Vogel Hook on Prince Charles Foreland, where he was impressed by the number of birds. But his work is chiefly memorable for the excellent description of parts of Spitsbergen which he gave in his book, *An Account of the Arctic Regions*, published in 1820. His descriptions were accurate and vividly expressed: many of them have not been surpassed to this day. Scoresby's work helped to give a scientific turn to Arctic exploration.

France has never taken much part in north polar exploration despite her splendid work in Antarctic regions. There were, however, French expeditions to Spitsbergen in 1838 and 1839. The visits of the cruiser *La Recherche* did not add much to our knowledge of the country: both were of short duration, and no attempt was made to push into unknown parts. Yet *La Recherche* has earned a reputation beyond its deserts through the French survey of Schoonhoven in Bell Sound, to which the name of Recherche Bay has since clung. This French expedition, though it did not originate the detailed exploration of Spitsbergen, was no doubt inspired by

a movement in this direction which had started a few years previously in Scandinavia. We must now turn for a time to the efforts of Scandinavia, principally Sweden, in the story of Spitsbergen exploration.

XII

MODERN EXPLORATION

IT must be a matter for historical pride in Norway that a Norwegian geologist was the first Scandinavian explorer of scientific training to visit Spitsbergen. It was in 1827 that Professor B. M. Keilhau made the journey in a hunting sloop hired for the purpose at Hammerfest. He took with him a German of an adventurous spirit who had been travelling in Lapland, but sad to relate he failed to persuade two Englishmen to accompany him. They are said to have withdrawn when they saw the vessel: one must not be fastidious in a Spitsbergen sloop. Keilhau hoped to visit Parry's expedition in the north, but ice prevented him. All he could do was some geological exploration around Edge Island and in Bear Island, but he showed the way and it was not his fault if Norwegians failed to follow and left Spitsbergen research to the Swedes for three-quarters of a century.

If we except A. R. Martin's voyage on a Swedish whaler in 1758, which only touched land for a few hours, the first Swedish scientist in Spitsbergen was Professor Sven Loven in 1837. His trip to the west coast gave scope for geological collections and some dredging in shallow water. Its chief importance,

however, was not seen until twenty years later, when it prompted Otto Torell to start the long series of Arctic expeditions which have shed lustre on Swedish science. So many and so fruitful have these expeditions been that Sweden has some justification for her claim that Spitsbergen is a Swedish scientific conquest. The justification might be more readily admitted if Swedes did not tend to forget that the pioneer work on which they built their superstructure of science was British and Dutch, and that Sweden has had no monopoly in later work. The great value of Swedish exploration has been its intensity and its continuity. Certain regions have been repeatedly visited till all the chief problems in cartography and geology have been solved, for it is in these branches of exploration that the Swedish work has excelled. Its continuity is shown in the return of the same men of science time after time in the quest of their objectives. After the first expedition probably not a single one has sailed from Sweden in which the majority of the explorers were not men of previous experience in Spitsbergen.

Of the prominent names in Swedish work in Spitsbergen that of Baron Adolf Erik Nordenskjöld takes a foremost place. A Finn of Swedish origin he settled in Sweden when a young man and became in time the foremost Arctic explorer of his adopted country. From 1858, when he first visited Spitsbergen with Otto Torell, to 1883, when he led the Greenland expedition, Nordenskjöld took part in ten Arctic voyages of exploration, including the famous voyage of the *Vega*, which in 1878-80 was the first vessel to

make the north-east passage and the circumnavigation of Asia. Long before Nordenskjöld retired from active participation in Arctic exploration Dr. A. G. Nathorst had entered the field. Of his five Arctic voyages three have been to Spitsbergen, all of which have had important results. Other Swedish explorers of Spitsbergen, who, like A. E. Nordenskjöld and A. G. Nathorst, were geologists, are Baron G. de Geer, Dr. J. G. Andersson, and Dr. B. Högbom.

Many of the Swedish expeditions have been assisted by State subsidies, or the use of gunboats to convey the explorers to Spitsbergen. The late King Oscar II was more than once a patron from his private purse, and Baron Oscar Dickson was a liberal supporter of several of Nordenskjöld's expeditions. Baron Dickson was the son of one of two brothers who migrated from Scotland to Sweden early in the eighteenth century. Both grew rich in business in Göteborg and gave liberally to their adopted land. So by chance it was a Scot who helped to make a Finn bring honour to Sweden in the realms of polar exploration.

Otto Torell's expedition in 1858 was a modest affair. Accompanied by Baron A. E. Nordenskjöld and Dr. A. Quennerstedt, he sailed in a small sloop for the west of Spitsbergen. Ice hampered the expedition a good deal, but collections of rocks, fossils, and marine animals were made in Horn Sound, Bell Sound, Icefjord, and as far north as the Norway Islands. After a visit to Greenland next year Torell began to mature his plans for a Spitsbergen expedi-

tion on a larger scale, one of his chief aims being to determine the possibility of measuring an arc of meridian in the far north, as had been suggested by Sir Edward Sabine more than thirty years before. Failing to secure the *Fox*, in which Sir Leopold McClintock had made his famous Franklin search expedition, Torell obtained two hunting sloops, the *Aeolus* and the *Magdalena*. A strong scientific staff included A. E. Nordenskjöld, A. J. Malmgren, N. C. Duner, C. W. Blomstrand and K. Chydenius, several of whom were Finns. An early start was frustrated by adverse winds, yet the expedition left Norway in the first week of May, 1861. A good deal of pack-ice was encountered, but the vessels reached Amsterdam Island in the north-west without great difficulty: another instance of the greater accessibility of the north-west than the south-west early in the spring. Thence they sailed to Treurenberg Bay and visited Parry's anchorage in Hecla Cove. Among other things they found a tin of roast meat, still quite edible, and a chest of ammunition. There they were imprisoned by the ice for nearly a month, but this was no hardship as there was plenty of scientific work to be done in the neighbourhood. However, Torell's plan of repeating Parry's northward journey over the ice had to be abandoned, chiefly because the expedition had been unable to reach the base early enough in the spring to find smooth, unbroken ice. It was therefore decided to explore as much as possible of Hinlopen Strait and the little-known and unsurveyed north coast of North-East Land. A great deal of the work was done in open row-boats, which entailed

considerable exposure, not to speak of hard work, but it was most successful. More than half Hinlopen Strait was mapped and geologically examined; the Seven Islands and the coast of North-East Land to Cape Platen were surveyed. At the end of the summer the expedition returned via the west coast bays, doing a great deal of useful exploration on the way. This expedition marked a real advance in the accurate knowledge of Spitsbergen.

The work of Torell's expedition was resumed in 1864 under the leadership of Baron Nordenskjöld, with whom were associated several of his former colleagues. In spite of another State grant funds were rather meagre, and the expedition had to be content with one schooner, the *Axel Thorsen*, provisioned only for six months, with no extra supplies in the event of enforced wintering. A few days were spent on Bear Island. Nordenskjöld converted an old Russian hut, perhaps a century old, into a photographic dark room, and so was able to take the first photographs of the island. Passing through streams of pack-ice—it was the month of June—the *Axel Thorsen* entered Icefjord. Several weeks were spent in exploring and surveying various parts of this great fjord before the vessel sailed for the east coast, visiting Lowe Sound and Horn Sound on the way. Storfjord had been the real objective of the expedition, but the visit was delayed till August in the hope of better weather and ice conditions. In this their hopes were justified and they managed to do much useful survey in Storfjord, but were unable to push further east on account of ice. The Swedish work

here was the first since that of Lamont a few years before, who initiated the modern exploration of the east coast. Nordenskjöld now decided he would finish his voyage by trying to get as far north on the west coast as the ice would allow. The way was clear, and good progress was being maintained when an occurrence, not unusual in Spitsbergen, upset his plans. Off Icefjord a boat was met coming from the north. The men were shipwrecked walrus hunters and stated that there were six other boats containing altogether thirty-seven men, from three vessels beset off North-East Land. Mattilas, of whom we have already heard, was master of one. Clearly the Swedes had no alternative to searching for these boats. Eventually all arrived safely and the overloaded *Axel Thorsen* sailed for Norway.

Up to this time the only available chart of Spitsbergen was little more than the Dutch chart of a century and a half ago, with some corrections by Buchan, Franklin, and Parry. In the main it was far from true and a long way behind the knowledge of the day. With the material then available Nordenskjöld produced a new chart, which is the basis of the modern chart. The extreme east was left unfinished, many of the long bays and fjords were incomplete, and the whole interior was blank, but the chart was an immense improvement on earlier productions.

The next Swedish expedition was in 1868. Its aim was a high northern latitude as well as the exploration of Spitsbergen and Bear Island. A. E. Norden-

skjöld was again the leader, and he advocated an attempt to sail northward from Spitsbergen in early autumn when the old ice would be rotten and the new ice would not yet have formed. He did not propose to force his ship through the pack-ice, realizing the futility of such action, but hoped to take advantage of open or nearly open water, which he was sanguine enough to expect to find. The attempt was to be made in October.

The funds were easily raised by public subscription in Göteborg, for the cost was estimated at the ridiculously low figure of under £1000. The Government lent a small schooner-rigged iron steamer, the *Sofia*, generally used for carrying Baltic mails in winter. Provisions were carried for seventy weeks. Among his staff Nordenskjöld again had one or two former colleagues, a sure test of his qualities as a leader. A late start was made, Bear Island not being reached till the third week in July, and Green Harbour not till the end of the month. Here Nordenskjöld continued his survey of Icefjord before going on to the north. A superficial examination of Foreland Sound was made in boats, and then the *Sofia* began to explore for a suitable harbour and a route to the north. It was a bad ice year, and though much exploration was done on the north coast the *Sofia* could not get beyond lat. $81^{\circ} 42' N.$, and the Swedes had to be content with holding the northern record for a *ship* by this impossible route. Coaling at Kobbe Bay on Danes Island, where supplies had been sent from Sweden, the *Sofia* made another attempt northwards early in October. Nordenskjöld hoped at



EXPLORERS' CAMP.

Vogel Hook, Prince Charles Foreland. Note the type of wind-resisting tent.

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least to reach the mythical land to the north-east of Spitsbergen, which had been born from Giles' discovery of 1707. The hope of accomplishing this project by sea had been abandoned: Parry Island, one of the Seven Islands, was proposed as a base from which long sledge journeys could be taken. But the *Sofia*, meeting heavy pack, was badly holed and only with difficulty reached Amsterdam Island in a sinking condition. After she had been repaired and made more or less seaworthy in King's Bay no course was left open but to return home. This expedition by being frustrated in the attempt to push far north served useful ends, for, like all other Swedish expeditions, it lost no opportunity of scientific research.

Before the next important expedition, again under Nordenskjöld, several other explorers did work in Spitsbergen. James Lamont, who was assiduous in his sporting trips, is mentioned among the yachtsmen and naturalists who have helped to make Spitsbergen known. Several small German expeditions, some of which did good work, must be recorded.

The first German Arctic Expedition was organized by the famous geographer, A. Petermann, in 1868, and sailed in the *Germania* under Karl Koldewey. Failing to reach the east coast of Greenland the expedition made for the north of Spitsbergen, and succeeded in sailing down Hinlopen Strait and home by the east coast. A somewhat more successful expedition, from the point of view of results achieved, was that of Theodor von Heuglin in 1870. He ex-

plored the coasts of Barents and Edge Islands and the head of Storfjord, adding a great deal of detail to the chart, although all his work has not stood the test of subsequent examination. Then followed a couple of small Austrian expeditions, neither of which achieved great results. In 1871 Lieutenant Karl Weyprecht, with Dr. Julius von Payer, left Tromsö in a sloop, hoping to follow the Gulf Stream into the polar basin. They were disillusioned, but visited Storfjord and Hope Island before returning home. The same two explorers trying the following year to make the north-west passage went further east, were beset in the *Tegetthoff*, and drifting two years, suffering terrible privations, discovered Franz Josef Land. Count Wilczek in the year the *Tegetthoff* sailed was in Spitsbergen waters in the *Isbjörn* exploring in Horn Sound and elsewhere. He placed a depot on the east coast for Weyprecht.

ore important were the explorations of Benjamin Leigh Smith, especially his first voyage in 1871, when he sailed in the schooner *Sampson* of eighty tons, with Captain Erik Ulve for his ice-master. The season was open and Leigh Smith was able to follow and map Hinlopen Strait from the north as far as Waygat Island. From there he saw the southern end of North-East Land, further south than had been expected: he named it Cape Mohn. Returning on account of ice the *Sampson* reached the Seven Islands and then sailed eastward along the coast of North-East Land for forty miles beyond Cape Platen. When Leigh Smith turned he found the coast, to his surprise, still trending eastward. The eastern cape was later

called Cape Leigh Smith. Expeditions in 1872 and 1873, the latter in a steam yacht, were less successful from the exploring standpoint owing to unfavourable ice conditions on the north coast. To Leigh Smith's timely succour of a Swedish expedition we will refer later.

All the Swedish expeditions so far recorded were summer expeditions, but Nordenskjöld had been planning one on a bolder scale. He visited Greenland to enquire into the suitability of Eskimo dogs as draught animals for a sledge expedition, but found that a contagious dog-sickness then prevalent put their use out of the question. He therefore decided to use reindeer and procured forty from Lapland. Several Lapps were taken to look after them and three thousand sacks of reindeer moss from Sweden were carried for their food. Nordenskjöld's plan was to advance polewards across the ice from some harbour on the north of Spitsbergen, probably in Parry Island. The vessels of the expedition were the *Polhem*, a small Baltic mail steamer, the brig *Gladan*, and a steamer for transporting stores, the *Onkel Adam*. The scientific staff was small as only a few men were meant to winter: it included Lieutenant E. Parent of the Italian Navy, one of the few Italian names in the history of Spitsbergen.

Sailing in 1872 the expedition visited Icefjord, Nordenskjöld's favourite ground, on its way north, and eventually anchored at Fairhaven in the Norways, waiting its chance to push eastward. The state of the ice was very unfavourable and several attempts

to force a passage failed. Leigh Smith, in the *Sampson*, paid Nordenskjöld a visit at Fairhaven and promised to look for him next year, little dreaming at the time how important the fulfilment of this promise was to prove. At length it was found to be impossible to reach the Seven Islands, and Nordenskjöld had to be content with winter quarters at Mossel Bay at the eastern side of the entrance to Wijde Bay. A winter house named Polhem and several observatories were built early in September. This was perilously late in the season for the vessels which were to return to Sweden. Arrangements for the departure of the *Gladan* and the *Onkel Adam* were hurried on, but suddenly the pack-ice bore into the bay and imprisoned them. Falling temperatures made release improbable and preparations had to be made to winter all three ships and their crews.

The situation was serious, for the provisions were quite insufficient: it had been intended to winter twenty-two men and now there were sixty-seven, while the store of provisions on the two imprisoned vessels would barely suffice for six months for their own crews. But worse luck was coming. On the last day of September six men arrived from the west with news that six hunting sloops had been beset at Grey Hook and Welcome Point. The crews numbered altogether fifty-eight men, and their provisions with strict economy and eked out by hunting could not last longer than December.

Nordenskjöld had already decided that by reducing rations to two-thirds he could feed his sixty-seven men, but to attempt to feed 125 men was practically

impossible. It was decided that a third of the number of hunters should try to reach Cape Thordsen, where there was a house of a Swedish mining company with ample provisions, and that the remainder should join the Swedes. A little relief was expected from hunting: perhaps the Swedes and the hunters themselves did not rely on this sufficiently. Bread was made with reindeer moss and rye flour and turned out palatable. The loss of the reindeer moss was of no account, because during a violent gale the reindeer had made their escape and were never seen again. That put an end to the prospect of a northern journey and deprived the hard-pressed men of a source of food they could have depended on in a last emergency. Regular scientific observations and excursions were started to keep everyone in good condition, but there were difficulties with so large a number of men, most of whom had not expected to winter. Fortunately there was ample warm clothing for all, and the vessels gave good housing. Several times during the winter it seemed that the ice was going to break up and liberate the vessels, and for a short period they actually lay in open water, but the pack was not far off.

The Norwegian hunters never came, as had been arranged, to Mossel Bay. The greater number had managed to return to Norway by their own efforts: two relief steamers sent to their aid had been unable to reach them. The fate of the seventeen who reached Cape Thordsen is told among the adventures of Norwegian hunters. At Mossel Bay the long winter dragged on, and the return of the sun found the Swedes

hopeful and planning journeys for the spring but very apprehensive at the alarming spread of scurvy. In the end of April Nordenskjöld, determined not to be thwarted in his plans of exploration, left for the east on a sledge journey. The sledges broke down, being unsuitable for the rough ice, and new ones had to be prepared. But Nordenskjöld pushed on with a few men to Shoal Point in North-East Land. There he waited for the new sledges before resuming his journey. Without great difficulty he reached Parry Island, but the tumbled chaotic pack-ice to the north decided him that it was impossible to advance further. He therefore resolved to explore North-East Land before returning to Mossel Bay. From Cape Platen to within some twenty miles of Cape Leigh Smith, the eastern extremity, he sledged along the coast, following in the main the sea-ice. In this journey Nordenskjöld was following in the wake of Leigh Smith, who only the previous summer had proved the great eastward extension of this land. The journey across the inland ice properly belongs to the account of the exploration of the interior of Spitsbergen. In the end of June the sledge party returned to Mossel Bay, and found the vessels nearly ready to depart.

On June 12, when the winterers were almost at the end of their resources, Leigh Smith had arrived with a large stock of fresh vegetables, preserved meats, wines, and tobacco, which he presented to the Swedes. Undoubtedly it was due to the timely arrival of this English yachtsman that many lives were saved: scurvy had such a firm hold that several men were

on the point of death, and could not have long survived on the stores available. As it was only one man died of disease, and the expedition returned safely to Sweden. This ended Nordenskjöld's explorations in Spitsbergen.

XIII

MODERN EXPLORATION (*continued*)

FOR several years no important expedition was made to Spitsbergen. Baron Norden-skjöld turned to the exploration of the Kara Sea and the north-east passage: this absorbed Swedish attention for a time. A Norwegian Oceanographical Expedition was devoted to research in the North Atlantic Ocean, but in 1878 paid a stray visit to Spitsbergen which resulted in a survey of Advent Bay. Another casual visitor was the U.S.S. *Alliance* which came in 1881 in a vain search for the lost *Jeannette* of De Long's American Expedition to the polar seas.

The small geological expedition of Dr. Nathorst's to Icefjord in 1882 deserves mention if only for the name of his sloop *Bjona* which was affixed to one of the finest harbours in Spitsbergen. Rough surveys were made of both Bjona and Temple Bays. The same year a large meteorological expedition from Sweden wintered at the house at Cape Thordsen. It had hoped to reach the north coast, but was prevented by ice. The expedition, which was taken to Spitsbergen by the gunboats *Urd* and *Verdande*, was part of an international scheme for a series of observations

that year in high southern and northern latitudes. S. A. Andrée on this occasion made his first acquaintance with Spitsbergen.

Small expeditions now became more frequent and we can notice only a few. Mr. Arnold Pike in 1888 intended to winter in Storfjord, but on being prevented by ice built a house on Danes Gat where he stayed till the following spring with seven Norwegians. Efforts to push north in his sloop failed, and in the summer of 1889 Mr. Pike visited Storfjord to hunt seals and walrus. This sporting trip was of less importance to exploration than Mr. Pike's second voyage nine years later. Gustav Nordenskjöld in 1890 led a modest expedition in a small sloop to the west and north coasts. It was principally of importance for his inland journeys.

America appeared in Spitsbergen in 1894 in the person of Mr. Walter Wellman. The *New York Herald* paid the expenses of the expedition, the aim of which was apparently to succeed, where Parry and Nordenskjöld had failed, in reaching a high northern latitude. His vessel, the *Ragnvald Jarl*, reached the Seven Islands in May, but was crushed in the ice. A house was built on Walden Island with the wreckage, and Wellman started on his sledge journey on the last day of May. In less than three weeks he was stopped by impassable ice in about lat. 81° N. and had to return. The explorers ultimately made their way over the ice, dragging boats with them, and so reached Norway. This was the last and least successful attempt to use Spitsbergen as a base for sledging to the Pole. We shall see later that it was

more than once suggested as a base for an aerial journey north.

The season of 1898 was an exceptionally open one on the east and north coasts of Spitsbergen. Fortunately several expeditions were planned for that summer and reaped the advantage of the unusual conditions. It was that summer that the Prince of Monaco began his Spitsbergen explorations with a successful voyage up Storfjord: we will return to this expedition later. A Norwegian sealing schooner belonging to Captain Nilsen the same year reported the discovery of a small island, Victoria Island, far to the eastward of North-East Land. The existence of this island, however, is doubtful: it is probably merely Giles Land misplaced in longitude.

The Swedish expedition of 1898, under Dr. A. G. Nathorst, was of considerable importance as it marked the first serious attempt to clear up the dispute about the Wiche Islands and reported lands to the east of Spitsbergen. The expedition sailed in the *Antarctic*, a vessel originally built in Norway for the Jan Mayen sealing and called the *Cap Nor*. The *Antarctic* had already visited South Polar lands: subsequently she became well known in Spitsbergen waters and carried a Swedish expedition to Greenland. Her end was as adventurous and honourable as her long career. Dr. Otto Nordenskjöld secured her for his South Polar Expedition to Graham Land in 1901. On the voyage to pick up the explorers at the end of the winter the *Antarctic* was caught in the ice and sunk in the dreaded Weddell Sea, but, fortunately, without loss of life.

Leaving Tromsö early in June the expedition devoted a crowded week to the mapping of Bear Island, which strange to say had never been properly surveyed until this late date. After a visit to Hope Island, where landing was impossible, as usual, on account of the heavy swell, pack-ice was encountered barring the way north. So to put in the time usefully until the pack had a chance of clearing the expedition made for Bell Sound and mapped Van Mijen (Lowe Sound) and Van Keulen Bays. Reindeer were found to be numerous and not at all shy : probably because murderous sportsmen seldom visit Lowe Sound. After some important deep-sea observations to the west of Spitsbergen, the *Antarctic* sailed for the east in the end of July and after an easy encounter with the pack reached the Wiche Islands, or, as the Swedes prefer to call them, King Karl's Land. The Swedes mapped and thoroughly explored the islands, settling definitely their size and position, but the controversy with regard to their name still exists. The main facts are worth stating.

Edge, in the employ of the Muscovy Company, saw in 1617, to the east of Spitsbergen, a land which he named Wiches Land. The discovery was recorded in *Purchas his Pilgrimes* in 1625 : "as farre to the Northwards as seuentie nine degrees, an Iland which he named Witches Iland, and diuers other Ilands as by the Map appeareth" The latitude of the islands explored by the Swedes is about 79° N. It is quite true that Purchas' map shows the land extending from south of lat. 76° N. to north of lat. 78° N., but Edge must not be held responsible for the errors

of his historian, who by ignoring the one fact he quotes Edge as citing about the land—its latitude of 79° N.—cannot be trusted in his interpretation of Edge's discovery. Undoubtedly these islands are Wiches Land and that name is now applied to them, with the substitution of Islands for Land, on the Admiralty chart. Wiches Land is not the small Ryk Yse Islands, as Scoresby thought, or Edge Island, as Nathorst suggests, both explanations emanating from too great a faith in Purchas' accuracy and too little belief in Edge's judgment.

But the muddle does not end here. The Wiche Islands were lost to sight after Edge's discovery and generally discredited. Elling Carlsen, the enterprising Norwegian hunter, was within a few miles of them in 1859 and 1863, but it was A. E. Nordenskjöld and N. Duner who rediscovered them from White Mountain on the mainland in 1864. They thought they had rediscovered Giles Land and spoke of a new Arctic continent. The obsession to discover an Arctic continent, despite the fact that there is not space for one on the globe, was very strong in those days.

In the same month of that year two English yachtsmen, Professor A. Newton and Mr. E. Birkbeck, sailed in sight of the islands. Six years later a German explorer, Theodor von Heuglin from Mount Midden-dorff, on the north of Edge Island, saw on the horizon, about sixty miles to the E.N.E., a steep-sided flat-topped mountain, which he ascribed to an island or foreland of "the mythical land in the east." This he named Swedish Foreland, in honour of Nordenskjöld. Sharp summits, which he thought he could

discern beyond Swedish Foreland, he named King Karl's Land after the King of Württemberg. These sharp peaks must have been an illusion of cloud effects, born of the myth of an Arctic continent, for there are no such features on the Wiche Islands.

Several walrus hunters must have known the islands, and Professor Mohn, of Christiania, turning to this source of importance, in want of direct evidence tried to unravel the tangle. In 1872 he constructed a map based on the information he had been able to collect, and named the islands King Karl (or Charles) Land, after Charles XV, King of Sweden and Norway. One of Mohn's skippers, Nils Johnsen, had landed on the east of the archipelago: J. Altmann and J. Nilsen had sailed close to its shores. Several years later H. Andreasen, another Norwegian hunter, proved the existence of a strait between Swedish Foreland and the main island by sailing into it, and he landed on Swedish Foreland. The same year Professor W. Kükenthal, of Jena, was in the vicinity of the islands on a Tromsö sealer. He did not land, but drew up a chart of his idea of the islands. Apart from the wholly unjustifiable substitution of German for Norwegian names of several features, the chart was a poor production and showed no advance on previous efforts. Unfortunately, with Victorian reverence for things German, a good deal of Kükenthal's erroneous charting was for a time incorporated in the Admiralty chart. The last explorer to visit the islands before the Swedish expedition was Mr. Arnold Pike, who was there in 1897 in the yacht *Victoria*. That was an exceptionally open year in all parts of Arctic regions.

The *Victoria* had no difficulty in reaching the extreme north of Spitsbergen via Storfjord, Heley Sound, and Hinlopen Strait. Returning down Hinlopen Strait she reached the Wiche Islands. Mr. Pike landed and made some important observations on the geology and topography of the islands.

The open season on the east coast in 1898 was also helpful to the German expedition of Th. Lerner under Captain Rüdiger in the *Helgoland*, which was at the Wiche Islands the month before the *Antarctic*. One or two names on the modern map emanate from the German expedition, but most of its observations were of little value and were of no help to the Swedes in constructing their map. What fame this expedition achieved lay in its circumnavigation of both west Spitsbergen and North-East Land and a few deep-sea soundings of value which it took. The rest of its work was chiefly zoological.

The Swedish expedition of 1898 also visited Giles Land or White Island, which lies to the east of Cape Leigh Smith in the extreme north-east of the Spitsbergen archipelago. It was discovered by Giles in 1707, but its small size not being known till long afterwards, it formed the basis of many rumours of lands linking Spitsbergen with Franz Josef Land and even of a hidden continent. A few Norwegian skippers had sighted it since its discovery, including Elling Carlsen in his circumnavigation of Spitsbergen. Mr. Arnold Pike had visited it, but apparently the Swedes were the first to land. They found it completely ice-covered and all but inaccessible. Giles reported that land in about lat. 80° N., which is more

or less right, and thus it appeared in the chart of Giles and Rep already referred to. By some chance or other it was misplaced by Petermann, the great German cartographer, being moved far to the north. There it remained on maps of all countries. Lamont spoke of a walrus hunter who said he had visited a land sixty or seventy miles to the north-east of Spitsbergen, which he called Giles Land. All he had to say about it was that it was "a hilly country, very like Spitsbergen, and that there were no sea-horses or seals, or even reindeer, there." This skipper was probably romancing: a land in that latitude would almost certainly be ice-capped and not like Spitsbergen. There is grave doubt that any such land exists, although Admiral Makaroff thought he saw it at a later date.

To complete the story of this most successful Swedish expedition we may note the *Antarctic* ended her voyage by circumnavigating Spitsbergen, reaching the latitude $81^{\circ} 44' N.$ in open water. The expedition no doubt was fortunate in the open season, for there are years when the Wiche Islands are quite inaccessible; but success was due also to good planning, a well-trained staff, and fine leadership.

Several Swedish expeditions have explored Spitsbergen at later dates. They were mainly confined to cartographical and geological work in Horn Sound and Icefjord: most notable was Baron de Geer's expedition which completed the survey of Icefjord in 1908. On a small scale these expeditions continued during the war. The Swedish part of the great task

of measuring the arc of meridian in Spitsbergen is mentioned in another chapter.

These many Swedish expeditions led to detailed maps of Icefjord and of the north-west coast, the former being mainly Swedish work, the latter incorporating Monagasque and other work. The Swedes were also able to publish a large scale geological map of most of Icefjord.

XIV

BALLOON AND SUBMARINE

THE lure of the North Pole never proved a stronger attraction than towards the end of the nineteenth century. Exploration had been pushed northward to the borders of the polar ocean, where heavy pack-ice had thwarted all attempts at further progress. The North Pole was within measurable distance, but the last stage presented great difficulties. New methods were required to supersede the old plan of sledge travelling. Nansen tried to drift across the Pole, allowing his ship to be frozen in the pack which was known to move slowly from east to west across the polar basin.

Equally courageous in its inception and no less likely to succeed was the plan proposed by S. A. Andrée of exploring the north polar regions by balloon. Andrée was a Swedish electrical engineer and physicist who as a young man of twenty-six had wintered at the Swedish Meteorological Observatory at Cape Thordsen in 1882. Since his return from that expedition, imbued with a desire for polar exploration he had paid a great deal of attention to aerial navigation. Eventually in 1895 he published his plans for a balloon expedition from Spitsbergen. The small sum required for the project, some £7000,

was soon collected, the chief subscribers being A. Nobel, Baron Oscar Dickson, and the King of Sweden. In June, 1896, the *Virgo*, with the aeronauts on board, left Göteborg with the good wishes of the whole country behind them. The scheme evoked criticism, as all daring adventures will, but it was far from being a hare-brained enterprise, as some of its detractors suggested. Andréé knew his business well, was not ignorant of the difficulties to be faced, and stood a good chance of succeeding. His failure was probably due rather to accident than to any flaw in his plans.

The balloon, which was named the *Eagle*, was made of Chinese Pongée silk and had a cubic capacity of about 150,000 cubic feet. It was varnished as a protection against snow and enclosed in a network of hempen cords. Technical details need not concern us : it is sufficient to say that Andréé took fully into account the peculiar climatic conditions in which he would sail. The timber and basket-work car was about six feet in diameter and provided with two glazed windows and a sort of bridge from which two of the three aeronauts could keep watch while the third slept. Three long guide-ropes were designed to trail over the surface of the ice, keeping the balloon at an elevation of some 900 feet. It was hoped that by means of these guide-ropes and the use of a sail some control could be exercised over the movements of the balloon, which otherwise would be entirely at the mercy of the wind. Simple means had been devised for releasing any guide-rope which became jammed and anchored the balloon. It could then be

replaced by a spare rope. About a ton of food was carried in the shape of compressed and highly nutritive foods, such as chocolate, condensed milk, and butter. There was, of course, a supply of fresh water and compressed bread. Luxuries were not altogether abandoned, for there were some bottles of champagne and claret on board. The need for hot meals presented a difficult problem. Cooking in the car was out of the question for danger of fire. A spirit lamp suspended in a cylinder thirty-two feet below the car floor was used. It was lowered to this position before being lit and was extinguished before being drawn up. Reindeer skins were carried for sleeping, and among the car's equipment were sledges, snow-boats, and even a light boat. Everything on board, balloon, ballast bags, spoons, cups, etc., were marked "Andrée's Polar Expedition, 1896," which would enable any relic of the expedition to be identified.

A bay, called Virgo Bay, on the north side of Danes Island was chosen as a suitable place for the balloon house. This adjoined the ruins of the old Dutch settlement of Smeerenburg and was the site of Arnold Pike's house erected eight years before. It was the end of July before preparations were complete and the balloon could be inflated. Two tourists' boats came up to see the start, and Nansen's *Fram* unexpectedly arrived from the north. Day after day Andrée waited for a south wind which never came. Winter set in early and by the middle of August it was clear that the attempt must be abandoned for the year. The balloon was deflated and packed up, and the expedition returned to Sweden.

During the winter improvements were made in the balloon, the capacity of which was increased by 22,000 cubic feet. It was decided also to lessen the load in the car by taking only four months' stores. This was ample since the balloon could keep afloat only thirty to thirty-five days, or by sacrificing most of the gear, and if necessary the car, another twenty days. About thirty carrier pigeons were taken, to carry messages back to Danes Island. In 1897 the expedition got away in May. The Swedish gunboat *Svensksund* accompanied the *Virgo* in case it was necessary to force a passage through the ice, work to which the *Svensksund* was accustomed in the Baltic. Danes Island was reached in the end of May after some difficulty with ice, and late in June the balloon was inflated, a full month earlier than the previous year. Several tourist boats were again on the scene, one in command of Captain Otto Sverdrup, formerly master of the *Fram*.

Weather conditions were favourable, and on July 11 the balloon started on her voyage. Andrée's two companions were N. Strindberg and K. Fraenkel, the latter of whom took the place of N. Ekholm of the previous year's attempt. The start was exciting: the strong wind eddying along Danes Gat swept the balloon seaward and for a moment promised to engulf it, but as the car touched the water the balloon rose. The guide-ropes caught on the rocks and had to be detached, but the mechanism for doing this worked well and new ropes were paid out from the car. Some 200 feet above the sea the balloon sailed north-north-east rising easily over the point of Amsterdam Island

and continuing on its course at about 22 miles an hour : in less than two days it should have passed over the Pole, and thence within two weeks it might have reached civilized lands : all depended on the wind.

A message by carrier pigeon sent on July 13 in lat. 82° N. reported good progress. Two messenger buoys also have been found, both thrown out by Andrée on the day of his departure. One buoy was found empty on the coast of Iceland in July, 1900 : another, numbered four, was found on the north coast of Norway in August the same year. Beyond these messages nothing whatever is known of the fate of the expedition. Various Arctic lands have been searched, Greenland, Franz Josef Land, and Siberia ; tales of Eskimo and Siberian natives have been investigated, but not a scrap of evidence bearing on the fate of Andrée and his two companions has come to light. Some unforeseen accident must have occurred which brought the balloon down either on the ice or in open water off the Siberian coast, in circumstances which gave the explorers no chance to save themselves. It is quite possible that the last news of their venture has not yet been heard : messenger buoys or fragments of the balloon imprisoned in the pack would drift slowly across the polar basin and eventually might be thrown up on the coasts of Spitsbergen or Greenland. Relics of the American ship *Jeannette*, wrecked in the vicinity of the New Siberia Islands in June, 1881, were found three years later on the south-west coast of Greenland. When it is remembered how

little most Arctic shores are visited, still less searched by man, it will be seen that possibly some relics of the Andrée expedition are lying cast up on some beach awaiting discovery. We can but hope that the mystery of the fate of these courageous Swedes will one day be solved.

The progress of aerial navigation soon prompted another attempt to reach the Pole by balloon from Spitsbergen. This time the project emanated in America. The expedition was financed by a Chicago newspaper and put in command of Mr. Walter Wellman who some years previously had led an unsuccessful expedition to the north of Spitsbergen. Mr. Wellman's balloon was a dirigible airship provided with three motors of an aggregate horse-power of eighty. It had a steel car over 50 feet long, in which was carried in addition to food, clothing, and instruments, several motor sledges and a small boat. The dirigible was designed to have a speed of 17 knots in calm water and to keep afloat for 20–25 days. A novel feature was the trailing or guide "rope," 130 feet long and 15 inches in diameter: the interior was packed with over 1000 lbs. of extra stores to which the explorers might have resource at the end of their journey, always provided that the guide-rope had not been destroyed in its long trail across the polar ice.

Leaving Tromsö in the *Frithjof* in June, 1906, a base was found on Danes Island, near the ruins of Andrée's house, but weather conditions proved unsuitable and the project was abandoned. The next two summers the *Frithjof* returned with Wellman

and his companions, but on both occasions the attempt was postponed. Camp Wellman proved an attraction for tourist steamers, but when for the fourth year in succession the dirigible was taken north no one expected that a start would be made. That year Wellman's ship was the *Arctic*, and tourist boats came north as usual to inspect the base. Major Isachsen, in his vessel the *Farm*, on his way to Red Bay, also visited Wellman but could not linger at Danes Island on the chance of the aerial voyage being started. However, on August 12, Wellman found the weather suitable and started, but his flight was short-lived. In less than 30 miles his airship fell into the sea, and as the crew were taking to the boats the *Farm* appeared on the scene, rescued all hands and towed the remains back to Danes Island. That was Wellman's last appearance in Spitsbergen.

The experiments of Count Zeppelin with his dirigibles in Cross Bay are noticed fully elsewhere: they seemed to have had no particular relation to geographical exploration.

So far no aeroplane has reached Spitsbergen. That is not a little remarkable as the distance from Norway is only some five hundred miles or a five hours' flight, but Spitsbergen was out of the war area and no aviator had time to think about it since the day when long distance flying became a commonplace of daily life. It is possible, however, that before these pages are published the first flight to Spitsbergen will have been successfully accomplished. Flying in Spitsbergen will have its uses in relation to the

commercial development of the country, particularly in exploring the position of the pack-ice early in the summer when ships are anxious to open the export trade for the season. There is little doubt also that some explorer will make use of the aeroplane for pushing north over the polar basin. For this purpose Spitsbergen will no doubt provide the base. Great changes in the map can no longer be expected, but there are certain doubtful points in polar geography that could probably best be cleared up by a combination of flying and work on foot.

With these aerial attempts at polar exploration may conveniently be grouped a daring proposal, made nearly twenty years ago, to reach the North Pole by submarine. The idea seems to have originated in Sweden but was developed by an Austrian, who is said to have given orders for a vessel to be built according to his plans at Wilhelmshaven. Submarine navigation has made such strides in recent years that it is valueless to give the details of what was then a novel type of vessel. It was constructed to descend 160 feet so as to clear all icebergs and be below the influence of gales. The length of time it could remain submerged was fifteen hours, which, at a speed of three knots, would allow it to cover forty-five miles. The great difficulty in the project was the possibility of open water not occurring among the pack at the necessary intervals. The vessel was faced with the alternative of either blasting an opening or returning to the last opening if a new one were not found within say six hours. The obvious criticism is that the last opening might have closed, and then what would

happen? But the great defect in the scheme was that even if the journey were successfully accomplished it would add practically nothing to our knowledge of polar geography. The expedition never started.

XV

EXPLORATION OF THE INTERIOR

THE exploration of the interior of Spitsbergen is a matter of recent history. Naturally enough to the whalers the coast-line was the only feature of importance. The trappers probably went inland up the ice-free valleys, but history is silent about their doings. Here and there a scientific expedition promoted short trips a few miles inland, but on the whole the high interior was an effective barrier to penetration. Explorers spread along the coasts, looked up the valleys and left the plateau alone. And so it came to be that the chart of Spitsbergen showed many glaciers pouring down to the sea from a wide inland region across which was printed "Inland ice." The term was the equivalent of "Unexplored" and was used for much the same reason that the mediæval cartographers, not caring to leave blank spaces or to display ignorance, portrayed ships and whales on the maps of the oceans or drew monsters in the interior of Africa.

By a strange paradox it was the ice-desert of North-East Land — a true inland ice-cap — and not the open valleys of central Spitsber-

gen, which first lured explorers into the interior.

Thwarted in his plans for a northern journey in the spring of 1873, after his wintering in Mossel Bay, A. E. Nordenskjöld turned to North-East Land in May, hoping to cross it from north to south in order to study the nature of its ice-cap, beside determining the extent of the island. Leigh Smith had reported that it extended much further to the eastward than was previously supposed. In June Nordenskjöld landed on the north coast and ascended to the high plateau surface of the inland ice. His intention was to push southward across the ice-cap to the neighbourhood of Cape Mohn. The northern slope was even and gentle and appeared to present no difficulties, but the party had advanced only a few hundred yards over the ice when a man fell into a deep crevasse. Fortunately the drag harness of the sledge held and saved him from disappearing in the black abyss. Thereafter progress was continually hampered by such crevasses, many of them covered by snow bridges which seldom held the weight of a man. Narrow escapes were numerous, but the men went roped and learnt to be careful, so that no lives were lost. This succession of pitfalls was bad enough, but there were other difficulties. Day after day a strong wind blew, driving fine snow before it, a particularly disagreeable kind of snow that finds its way into any clothing. There was no shelter on this tableland of ice, at an elevation of some two thousand feet, except the thin canvas tent at night. On the rare occasions when the weather was calm there was so thick a mist that

travelling was impossible. On those days there was no alternative to forced and tedious inactivity in the sleeping-sacks.

As Cape Mohn was approached the inland ice presented a new kind of trap. This took the form of canals, as they were aptly termed. Long strips of the ice, thirty to a hundred feet wide, were found to be thirty to forty feet below the general level and flanked by steep cliffs. The cliffs were bad enough in themselves, but they often dropped into deep crevasses partly hidden by snowdrifts. Parallel canals often succeeded one another at intervals of three hundred feet and made progress slow and anxious. The one consolation the explorers derived from these canals was that the bottom gave a sheltered site for camping. Finding the surface becoming worse, and practically impassable, Nordenskjöld turned westward over the ice-cap to Hinlopen Strait, eventually reaching Wahlenberg Bay without mishap. From there he reached Shoal Point and returned to his headquarters at Mossel Bay. This adventurous journey was most important. It occupied only a fortnight but threw a flood of light on the nature of the only great ice-cap in Spitsbergen. Since Nordenskjöld's day the interior of North-East Land has not been revisited.

The next explorer to leave the coast of Spitsbergen and strike inland was Gustav Nordenskjöld. In 1890, with two companions, he travelled from Horn Sound to Bell Sound, a distance of some thirty miles. The journey in itself was not of great importance but it marked the first overland journey in Spitsbergen

proper of which any definite record was made. Nordenskjöld also did the easy journey between Advent Bay and Coles Bay which has since been made many times. A more important journey was that in 1892 of M. Charles Rabot, the French explorer. This was not M. Rabot's first experience of Spitsbergen, but his autumn visit ten years earlier in a hunting sloop with Mr. A. H. Cocks had been a naturalist's trip rather than a voyage of exploration. The training ship *La Manche* in 1892 was ordered to visit Jan Mayen and Spitsbergen. M. Rabot, who was attached as geographer, made the most of his limited opportunities when the vessel was lying in Sassen Bay and he had forty-eight hours at his disposal to devote to exploration. Accompanied by a sailor he ascended the Sassendal for about eighteen miles to the glacier subsequently named in his honour by Conway, at the entrance to Fulmar Valley. There he climbed a peak which he named Mount Milne Edwards. This was a spirited journey even if a short one and marked a step in advance in the exploration of Spitsbergen. A passing reference may be made to the Jeaffreson expedition of 1896. Dr. Jeaffreson returned to Norway without doing any exploration, but Mr. Huyshe Walkey remained at Advent Point during the summer and returned home with Baron de Geer. This expedition added nothing to the map.

Then we come to the important explorations of Sir Martin Conway, who made his first expedition to Spitsbergen in 1896. He was accompanied by Professor J. W. Gregory, who even at that time was

a traveller of wide experience, Professor E. J. Garwood, and Mr. A. Trevor-Battye. Their aim was the exploration of the interior, including survey and geological work. Reaching Icefjord in the middle of June the expedition was delayed by ice in making Advent Bay, where the first base camp was made. In those days Advent Bay knew no mining camp and busy shipping, but a small tourist hotel was opened that summer at Advent Point. Attention was first paid to the country south of Advent Bay in the hope of finding a route through the mountains to Lowe Sound. Vague reports of hunters, which proved to be quite inaccurate, were the only guide which the explorers had. Ascending Adventdal with sledges drawn by ponies they camped at the mouth of Fox Valley and made the ascent of Fox Peak, 3180 feet, over the snowy slopes of Bunting Bluff. The view from the summit made it clear that there was no road by which the ponies could be taken to Lowe Sound. Sledges and ponies were therefore sent back to the base while Conway and Garwood set out up Fox Valley. Over Fox Glacier they reached a pass at a height of 2550 feet and descended Plough Glacier to a wide open valley, which they named Dreary Valley. In mist and gloom these ice-free valleys, with their wide sluggish rivers, dark swamps and general sombre colours can well deserve such a name. Dreary Valley was followed till it opened into the great Dry Valley, or Stordal, some six or seven miles from Lowe Sound. This great valley is open for nearly twenty miles from its mouth, and was well known to the Dutch, who called it Oudiepe, or the Shallow River

Valley. Conway and Garwood then returned over the Bolter Pass, 1340 feet, and the Bolter Valley to Adventdal.

The next journey was eastward up Adventdal, and here the ponies could be used. If the explorers could have crossed Advent Bay at the start and followed the north instead of the south side of the valley their progress would have been less difficult. I have tried both and found the north side gives good travelling surface which the south does not. At the head of Adventdal the low Brent Pass at only 450 feet and quite clear of ice led to the Esker Valley by which the descent was made to the Sassendal. On the way Garwood, with an insatiable desire for mountaineering, climbed Booming Peak, and accompanied by Conway ascended the snow-free hill, the surface of which earned for it the name of Sticky Keep.

At this point the expedition was delayed for some days by a breakdown in transport. The time was utilized for local exploration and mapping, while Gregory made a fine solitary march to Advent Bay in about twelve and a half hours. Measured on the map the distance is thirty or thirty-five miles, but owing to the nature of the ground it was the equivalent of well over forty and as tiring as a fifty-mile tramp on a good track.

At length, provided with new sledges and the two ponies, the whole expedition started up the Fulmar Valley to seek a route to the east coast. The prospects appeared good till a glacier was encountered at the head of the valley. Probably the ponies would have

to be left and the march continued with much reduced baggage over the high and exposed ice surface. Luckily this was not necessary, for the Ivory Gate, as the ice mass was named, proved to be only the snout of a glacier projecting into the valley. It was easily crossed in a short excursion from the camp, and in a few hours Agardh Bay was reached. Streams from the glacier drain across low ground to the sea, producing what Conway graphically describes as hybrid stuff, with a watery surface and a muddy substance, not strong enough to support nor liquid enough to float anything.

Returning to Icefjord, Conway and his companions made explorations in the valleys around Windy Point and Mount Lusitania. Trevor-Battye had meanwhile been exploring Dickson Bay, a branch of Icefjord which is seldom visited, and had made an inland journey from its head. The expedition then embarked on the *Expres* for a flying visit to the west and north coasts of Spitsbergen, which included a trip up Wijde Bay, a visit to the Seven Islands, and a journey through Hinlopen Strait and back. Then to round off a successful expedition Garwood, with Trevor-Battye, climbed Hornsunds Tind, or Mount Hedgehog, overlooking Horn Sound.

This expedition made sketch maps of all the inland regions visited, which have proved of use to other explorers who have followed in their footsteps. More important were the geological researches and the discovery of much open country in the interior of Spitsbergen.

Next year Sir Martin Conway returned to Spits-



LAKE RICHARD, RED BAY.

This lake contains salmon. On the left, a glacier is seen descending from high ground.

The foreground of the above shows what rough going there is in Spitsbergen. The life of a pair of boots is about three weeks.

bergen with Professor E. J. Garwood and two Norwegian seamen. Areas marked "Inland ice" on the chart were chosen for examination, the first in King James Land, the second in Garwood Land. The explorers ascended the Nordenskjöld Glacier at the head of Klaas Billen Bay, and despite atrocious weather reached the Chydenius Range on the borders of New Friesland. From King's Bay they went up the King's Glacier in superb weather and in three days were at the pass looking down towards Icefjord from a height of 2500 feet. Then they turned and devoted several days to the exploration of the Three Crowns region, climbing several of the peaks, including Diadem Peak, 4212 feet high. This expedition demolished the theory of the presence of inland ice, at least in western Spitsbergen.

The Russo-Swedish expeditions for the measurement of the length of an arc of meridian were not primarily concerned with exploration, but in the course of their work naturally did a great deal of accurate survey work. The pity is that the Russian results are not yet fully published. Sir Edward Sabine had first proposed this task in 1823, but Great Britain never undertook the work. Sweden revived the project and persuaded Russia to co-operate. The work began in 1898 and ended in 1902. The Swedish station was at Treurenberg Bay where a party wintered one year. The Russian base, originally intended to be in Whales Bay on the east coast, was eventually made at Horn Sound. Dr. E. Jäderin and Baron de Geer were in charge of the Swedish work which was much hampered by ice on the north

coast, but the year in which the *Antarctic* replaced the gunboat *Svensksund* as the vessel employed by the expedition good results were obtained. Incidentally it may be noted that the *Antarctic* made the difficult voyage from Storfjord through Heley Sound to Hinlopen Strait. The Russian parties which were in charge of Captain D. Sergizhevski and Dr. T. N. Tchernichev were engaged three summers and one winter on the work : their vessel was accompanied by an ice-breaker. The greater share and the more difficult part of the work fell to the Russians, but they succeeded in fixing the position of all prominent points on the east coast from South Cape and Hornsunds Tind to Thumb Point at the entrance to Hinlopen Strait. The foundation of the accurate survey of Storfjord and Barents and Edge Islands was laid by the Russians, and in the course of their work they made many journeys in the interior including, several from sea to sea.

Dr. W. S. Bruce's crossing of Spitsbergen from Sassen Bay to Storfjord is referred to among his many other explorations.

One German expedition did useful work in the interior. Lieutenant W. Filchner went to Spitsbergen in 1910. At the time he was preparing a German Antarctic expedition, which he subsequently led in the *Deutschland*. His Arctic visit was planned with a view to gaining experience and testing the sledges and other equipment. Landing on the south of the Post Glacier he travelled across Spitsbergen down the Hayes Glacier to Mohn Bay on Storfjord. The whole journey, which totalled about fifty miles,

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was over ice. It was quite a creditable performance and resulted in a large scale map of the region.

The Norwegian survey of the interior of west Spitsbergen began in 1906 under the auspices of the Prince of Monaco. The Prince invited two parties of explorers to accompany him on the *Princesse Alice*: a Scottish party, under Dr. W. S. Bruce, which was to begin the exploration of Prince Charles Foreland, and a Norwegian party, under Captain (now Major) Isachsen, which was to survey King James Land. Captain Isachsen was an experienced polar traveller, having been a member of Otto Sverdrup's expedition of 1898-1902 to the Canadian Arctic Archipelago, where he had done much survey work. Captain Arve Staxrud, five other Norwegians and a French surgeon completed the party. A base line was measured near Cape Guisnez in Cross Bay and the triangulation was linked up to Point Bruce in Red Bay, which had been carefully surveyed by the Prince of Monaco in 1899. The following year the Prince of Monaco again invited both Dr. Bruce and Captain Isachsen to continue their surveys. The Norwegian party was smaller than in the previous year and included Adolf Hoel, who the previous year had begun a long series of researches on the geology of the country, and the botanist, Miss Resvoll Dieset, now Mrs. Holmsen, who was the first woman explorer of Spitsbergen. Owing to a case of serious illness on board the *Princesse Alice* had to return to Norway in August, leaving the *Kvedfjord*, a small Norwegian steamer, to bring home the two expeditions. How Captain Isachsen managed

to miss Dr. Bruce's party, who had an adventurous trip back to Tromsø, will be told later.

That was the last year the *Princesse Alice* visited Spitsbergen, but in 1909 the surveys were resumed, Captain Isachsen having at his disposal a handy vessel called the *Farm*. So far the cost had been borne by the Prince of Monaco, but now the Norwegian Government began an annual subsidy. The Nansen research fund and private subscribers also assisted. Among the private subscribers have been the Nordenfjeldske Shipping Company and various Norwegian mining companies, who realized the value of good surveys. Every summer an expedition has gone north to resume the work. For some years Major Isachsen had command, and then Captain Staxrud succeeded him. Adolf Hoel has generally been a member of the party: in 1917 and 1918 he had command. The whole of the western part of the main island has now been surveyed. To the east the survey will be linked up with the unpublished work of the Russo-Swedish Arc of Meridian expedition. On the west it is completed by Bruce's survey of Prince Charles Foreland.

The Norwegians work rapidly, being adepts in the use of ski and accustomed to travel on snow. But survey of the interior at considerable heights is not easy on account of the frequent mists. One summer, ten days in forty-six, and another summer, eight days in thirty-one, were practically useless for this reason. Work must be hurried in fine weather and these bad days are practically the only ones when the Spitsbergen surveyor can get a rest and

a good long sleep. Captain Isachsen began his work by trying various survey instruments, in order to decide which were best adapted to the conditions. He made considerable use of the photogrammetric method which, in general terms, is a combination of photography with the use of the plane table. The method is valuable in filling detail into a trigonometrical network. Eight years previously a Swedish expedition used this method successfully at the Wiche Islands. In various years the Norwegians did some harbour surveys as well as their inland work. These have proved valuable additions to the chart, for the coast of Spitsbergen, with the exception of Icefjord, although outlined on the charts for many years, is frequently shown in the wrong position and is often innocent of important detail.

The Norwegian Government in giving financial support to these expeditions has shown considerable enterprise. With the exception of Sweden and Russia no other State has granted funds towards the exploration of Spitsbergen. The expeditions of the British Government a century ago were designed to reach the Pole and not primarily to explore Spitsbergen.

The exploration of Prince Charles Foreland will be described later, but one other expedition, under the patronage of the Prince of Monaco, must be mentioned here. In 1913 he enabled a small expedition, under Dr. Hermann Stoll, a Swiss, to explore the region between the head of Lowe Sound, or Van Mijen Bay, and Agardh Bay on Storfjord. The party set out by Kjellström Valley at the head

of Braganza Bay. After a long march up an open valley very comparable in most respects with the Sassendal, they crossed a pass at about one thousand feet and descended to a new valley of a swampy nature which led to the sea. Thus Spitsbergen was crossed by a new route.

XVI

DR. W. S. BRUCE'S EXPLORATIONS

IT was during a cruise in the Barents Sea over twenty years ago that Dr. W. S. Bruce first saw Spitsbergen. The *Blencathra*, belonging to Mr. Andrew Coats, was returning in July, 1898, from a sporting trip to Kolguev and Novaya Zemlya, when the Wiche Islands, Hope Island, and Bear Island were sighted. An attempt to land on Hope Island failed on account of the heavy swell, but some useful soundings were taken in the surrounding seas. The yacht then returned to Tromsö. Lying in the harbour was the *Princesse Alice*, the yacht which the Prince of Monaco had built and equipped for research into the physics and biology of the oceans. The Prince of Monaco was making his first visit to Spitsbergen and he invited Dr. Bruce to accompany him.

Dr. Bruce was already an experienced polar traveller. In 1892 the Dundee whalers, looking for new fishing grounds, had gone to the Antarctic, visiting the seas around Graham Land. Dr. Bruce had signed on as surgeon on the *Balæna* as the only means by which he could accompany the expedition. This was a rough experience, and the work that fell to his

lot was chiefly that of a sealer, but it imbued him once and for all with that intense love of polar regions which has drawn him north or south on nine subsequent expeditions. Four years later Dr. Bruce was in Franz Josef Land wintering with the Jackson-Harmsworth Expedition at Cape Flora and narrowly escaped reaching the Wiche Islands on the voyage home.

Leaving Tromsø the *Princesse Alice* visited Bear Island and Hope Island, where landings were made, and then entered Storfjord. This is frequently a difficult fjord to navigate on account of pack-ice, but in 1898 the sea was open and the ship was able to reach the head of the fjord and to remain there several days. It was the same open season that enabled the Swedes in the *Antarctic* to explore the Wiche Islands, as already recorded. The *Princesse Alice* then cruised up the west coast of Spitsbergen as far as Danes Island for the main work of the expedition, hydrographical research to the north and north-west.

This Arctic reconnaissance led to the Prince of Monaco undertaking a more important expedition the following year. He again invited Dr. Bruce and Mr. J. Y. Buchanan, formerly of the *Challenger* expedition round the world, to accompany him. The chief of the scientific staff, as on all the Prince's expeditions, was Dr. Jules Richard, now head of the Oceanographical Institute at Monaco. There were also on board Captain Guissez, Dr. Portier, and Mr. William Smith, the last-named as artist. Captain Carr was as usual in command of the ship. On her



RED BAY.

Looking west from Point Bruce with Chaveau, Fortier and Fuhrmeister glaciers. The *Princess Alice* at anchor.

way north from Havre the *Princesse Alice* called at Kiel. Both there and at Bergen the ex-Kaiser showed great interest in the expedition. At Bergen an event of some historical significance took place. Two training ships, the one French and the other German, were lying at anchor when the *Hohenzollern* steamed into the harbour flying the French flag at the fore. A few hours later the German Emperor paid a visit to the French ship, the first time he had done such a thing since the Franco-Prussian War.

This kind of pleasantry was not allowed to delay the expedition for long, and the *Princesse Alice* was soon on her way to Liefde Bay in the extreme north of Spitsbergen. It was intended to make a detailed survey of this bay, which at that time was little known, in the hope that such an examination would throw some light on the glacial history of the country. Ice, however, blocked the bay and prevented the vessel entering. Immediately to the west lies Red Bay, which was then marked on the chart as a shallow bay. The *Princesse Alice* entered to explore and found herself in a deep, narrow fjord. This made the Prince of Monaco decide to devote the summer to a survey of the fjord. For this purpose a party under Captain Guisnez was landed at Point Bruce, and a base line was measured to the adjacent Richard Valley. This valley is remarkable in containing one of the few lakes in the country, and one which contains a number of salmon. The survey was continued day by day and was nearly finished when the fortunes of the expedition took a dramatic turn.

The *Princesse Alice* had been round the coast to coal at Advent City. She successfully accomplished the navigation of many miles of imperfectly charted coast-line and was steaming cautiously up Red Bay to her anchorage off Point Bruce when she ran on a rock. The lead line had given no indication of this pinnacle arising from comparatively deep water, and the surveyors in their sounding had missed it. In the 2400 soundings taken in the bay not another rock had been found. It was a piece of irony to suffer shipwreck in the best charted bay in Spitsbergen. Efforts to float the ship failed and it became necessary to face the possibility of wintering. A steam launch was got ready to take the store-keeper's wife and another woman round to Advent Bay, whence they would be able to reach Norway. The launch was in charge of a Scottish whaler and had a Norwegian pilot and a crew of two Frenchmen. Despite bad weather the three hundred miles journey to Advent Bay and back was made safely. Meanwhile Dr. Bruce was busy organizing a shore encampment on Point Bruce, so named in his honour by the Prince of Monaco. This was no easy task, for the ship's company totalled about sixty, many of whom were quite unprepared and little suited for the rough life of an Arctic encampment. However, in a few days' time, while two hundred tons of coal were thrown overboard, Dr. Bruce had arranged sleeping accommodation ashore for all hands, had landed coal enough for a wintering and provisions for about four months. And then as luck would have it the ship floated on the following day. The shore encampment was

struck, coal as far as possible, stores and gear were reloaded, and preparations made to sail. All this took some days, and before the *Princesse Alice* was ready to depart the Swedish gunboat *Svensksund* appeared. She had come to Spitsbergen with the Swedish Arc of Meridian expedition and calling at Danes Island had seen the notice of distress left there by the *Princesse Alice's* launch on her journey to Advent Bay. The *Svensksund* accompanied the *Princesse Alice* to Treurenberg Bay, the headquarters of the Swedish expedition. After coaling there the *Princesse Alice* left for the south. Being much injured she was in no state to face bad weather, and so lying in Recherche Bay she watched her opportunity and slipped across to Tromsö during a fine spell.

For a few years Dr. Bruce's attention was occupied once more with south polar problems. From 1902 to 1904 he led the Scottish National Antarctic Expedition in the *Scotia*, which successfully explored the Weddell Sea and, by the discovery of Coat's Land, added about half a million square miles to the probable land area of the globe. Soon after he returned from the Antarctic Dr. Bruce was again in Spitsbergen accompanying the Prince of Monaco on his third Arctic voyage. Late in June, 1906, the *Princesse Alice* called at Granton to embark Dr. Bruce, who was accompanied by Mr. E. A. Miller and Mr. Gilbert Kerr, the latter of whom had been in the *Scotia* to the Antarctic. The plan of the expedition was to land the Scottish party on Prince Charles Foreland, the most westerly island of the Spitsbergen

archipelago, which was at that recent date practically unexplored. The only previous explorers who had recorded any observations on the island were Phipps, Scoresby, James Lamont, and Dr. A. G. Nathorst. It is probably the western position of the Foreland that had delayed its exploration. In any unknown country, where a wide field of work is waiting, the explorer naturally takes the most inviting regions first and leaves the more difficult tasks to his successors. Prince Charles Foreland is sighted by every vessel arriving in Spitsbergen, generally as a mist-wreathed island whose shores are lashed by a heavy surf. On the other hand, the fjords of the mainland are fine, calm waterways leading to the sunny interior. Little wonder that the Foreland had been so long neglected.

It was by no means easy to find a suitable landing-place, but eventually Dr. Bruce and his companions were landed on the north-east of the island, somewhere in the vicinity of the English whalers' station of nearly three centuries ago. Travelling was found to be extraordinarily difficult owing to the rough ground: as far as possible resort was had to the boat for any long journeys along the coast. Glaciers and great lagoons on the east side also impeded progress. On the west coast the way was easier on the whole, but heavy westerly gales interfered with the work. For two weeks gale followed gale and heavy seas broke on the shore, the spray blowing far inland: fog and mist prevailed continuously. However, despite difficulties of this nature, a great deal of work was done, and by the time the expedition sailed for

home in the end of August, about 120 square miles, or roughly the northernmost third of the island, had been mapped. While Dr. Bruce's party was on the Foreland the *Princesse Alice* had been making high level meteorological observations by means of balloons off the north-west of Spitsbergen. A Norwegian survey expedition, under Captain Isachsen, had also been landed on the mainland: its work is described in another chapter.

Next year Dr. Bruce continued his survey of the Foreland, assisted by Mr. Gilbert Kerr, Mr. J. V. Burn-Murdoch, and Mr. Stewart Ross. The party landed on the south-west of the Foreland, opposite the Edinburgh Isles, on the edge of the bleak desolate plains since called the Foreland Laichs. The snow was not off the ground when work was begun, and so great was the progress made that at the end of the summer practically the whole survey of the island was complete, with the exception of a little detail at the extreme south.

The Prince of Monaco, who had been engaged in meteorological observations further north, had arranged to call at the Foreland to pick up Dr. Bruce's party and carry them home. A serious case of illness on board the *Princesse Alice* necessitated her early return to Norway. Under these circumstances it fell to Captain Isachsen, who was conducting his survey of the adjacent mainland, to arrange for the transport of the Scottish party. The *Kvedfjord* was left for this purpose with Captain Isachsen, and with that steamer he anchored off Poole Point, in Foreland

Sound, on August 10, bringing with him Captain Hjalmar Johansen, who hoped to find Dr. Bruce prepared to winter with him somewhere on the Foreland. A messenger sent across the Laichs to the Scottish base camp found Burn-Murdoch in charge, the rest of the party having gone north to Cape Cold. Isachsen arranged with Burn-Murdoch to return to Poole Point between August 25 and September 10. This arrangement Dr. Bruce took to mean, when he heard of it, that the *Kvedfjord* would be at Poole Point not before August 25 and would remain till September 10 at latest. Weather and travelling conditions in the Foreland make it impossible to time one's arrival at any given spot within a week or ten days. On August 30 the *Kvedfjord* arrived at the anchorage. A messenger sent across the Laichs to Bruce's base camp returned with Burn-Murdoch and a Norwegian sailor who was a member of the expedition. They reported that Bruce was somewhere in the north of the Foreland. The Norwegian sailor set out for Cape Cold along the west side and the *Kvedfjord* sailed up Foreland Sound, searching the coast. But there was no sign of Bruce, Kerr, and Ross, either then or on the return of the *Kvedfjord* from a coaling trip to Advent Bay. Captain Isachsen came to the conclusion that Bruce had decided to winter, although this had never been suggested, and his stock of provisions was small. It was arranged that a party of hunters who had arrived at the Foreland should keep an eye on Bruce's camp and that their sloop, the *Johanes Bache*, should wait a few days before returning to Tromsö. On September 5 the *Kvedfjord* sailed

for Norway, but the Norwegian sailor attached to Bruce's expedition loyally decided to stay behind. On the stipulated date the lost explorers turned up surprised to hear that there had been any anxiety on their account and astonished to find the *Kvedfjord* had sailed. However, the *Johanes Bache* served the purpose and brought them safely to Tromsö in September, after the busybodies, craving for sensation, had written mournful notices in the press about the lost Scottish explorers!

That year's work almost completed the exploration of the Foreland, but a few details of survey and some geological work remained to be done. With these objects among others Dr. Bruce organized a new expedition in 1909. The Prince of Monaco again supported the expedition but did not go north himself. The vessel was the *Conqueror*, formerly a Leith trawler, admirably suited by reason of her handiness and great strength for such work. Captain F. B. Napier was in charge of the ship, and Dr. Bruce's large scientific staff included Mr. J. Mathieson, of H.M. Ordnance Survey; Mr. H. Hannay and Mr. A. Peach, as geologists; Mr. E. A. Miller and Mr. J. V. Burn-Murdoch of former expeditions; Mr. Alasdair Geddes, and Dr. R. N. Rudmose Brown. Time has already divided that little band. Peach died a few years later in Egypt, while engaged on important geological work; Miller is lost to sight somewhere in South America; and young Geddes fell in the European War, as a Major in the Royal Flying Corps, at the early age of twenty-six,

after winning the military cross and the legion of honour.

The *Conqueror* landed a party on the Foreland, which travelled round the southern end exploring the Ross Heights and completing the map of that part. Meanwhile geological examination of other parts was conducted and a great deal of information collected, particularly in the Sassen Bay region. Dr. Bruce and Mr. Hannay crossed Spitsbergen from Sassen Bay to Storfjord by a hitherto untraversed route, which entailed a long march over a difficult glacier region. To cut a long story short, this expedition was most successful and opened the way for further work, besides rounding off the exploration of the Foreland.

In 1912, and again in 1914, Dr. Bruce led small expeditions to Spitsbergen. The first of these was concerned mainly with geological work, but was much hampered by abnormally bad ice conditions. The second aimed at hydrographical research in Storfjord. Two of Dr. Bruce's former companions accompanied him on these expeditions, Dr. R. N. Rudmose Brown on one, and Mr. J. V. Burn-Murdoch on the other. The plan of going to the north end of Storfjord was thwarted by ice: several fruitless attempts were made on successive days to enter the fjord, but the heavy pack showed no break from Edge Island to forty miles south of South Cape. The vessel therefore made for the west coast, and entering Green Harbour first heard of the outbreak of war. The plans of the expedition were changed, and it was decided after a short stay in Spitsbergen



PRINCE CHARLES FORELAND.

View along the west coast looking northward from Cape Cold. Mount Allan in the foreground, and Mount Jessie in the distance.

to return to Norway, without making another attempt to enter Storfjord, which might entail long delay and even the possibility of a wintering. Mr. R. M. Craig and Mr. J. H. Kenneth were left to make further researches in the geology of the Foreland, while the *Pellicane*, the Norwegian sloop carrying the expedition, went to land coal for its Norwegian owner at the German Meteorological Observatory in Cross Bay. Dr. Bruce was able to make a valuable report on the equipment of this station and the activity of its staff of German scientists. Dr. Bruce and Mr. Craig then crossed the Foreland from Richard lagoon to the west coast and joined the *Pellicane* off Mount Jessie. Much valuable geological work was done.

This outline of Dr. Bruce's work in Spitsbergen on his many expeditions can give only an imperfect idea of the amount of painstaking research accomplished, but the completed map of Prince Charles Foreland speaks for itself. Probably no other part of polar regions, certainly no part of an equal area, has been mapped in so great detail. The geology and natural history of the island have also been fully described. That is the type of polar exploration that is required now that most of the pioneer work of discovering new lands, or of disproving reported ones, is nearly complete.

With nearly all Dr. Bruce's expeditions to Spitsbergen the Prince of Monaco was closely associated: Norwegian and Swiss expeditions have taken the field under the same auspices. Probably no man has done more to promote the scientific exploration

of Spitsbergen than the Prince of Monaco. He has personally led four expeditions, while his initiative and support have been responsible for many others. Without his help and interest our knowledge of the country would be far less advanced than it is to-day.

XVII

TOURISTS AND YACHTSMEN

THERE are few countries in the world where the explorer and the tourist meet. Perhaps Spitsbergen is the only one. It is certainly the only part of polar regions which tourists ever get a chance to visit. In that country of anomalies the explorer camping in some unexplored glen may see passing a few miles off a ten-thousand-ton liner, replete with its civilized luxury. He may sit by his camp-oven eating his reindeer stew or his bully beef and hear across the water the strains of a band breaking the monotony of a ten-course dinner of the jaded seeker for health and novelty.

The tourist industry, as it has been called in Spitsbergen, is not a new one. Long before Spitsbergen was anything but a name on the map of polar regions to the majority of the people in Britain, an enterprising sea captain started the traffic. Captain W. Bade, a German naval officer from Weimar, who had been second officer of the *Hansa*, one of the vessels of the German expedition to east Greenland in 1869, in 1871 took a small party of his fellow-countrymen on a short cruise from Norway to Spitsbergen. Some twenty years later Captain Bade revived his cruises,

and had such a measure of success that he continued them for many seasons.

It was not, however, until 1893 that the tourist traffic on a large scale began. In that year the Hamburg-Amerika Line sent the *Columbia* to Advent Bay. Next year the Orient Company sent up the *Lusitania*, which visited Icefjord among other places and passed the parallel of 80° N. latitude. The well-known *Vectis* of the P. and O. Company continued the traffic in later years, as well as other vessels of the Orient Company. But the most ambitious scheme was one started by the Vesteraalen Steamship Company of Norway. In 1896 they erected a small tourist hôtel at Advent Point. This was not an hotel in the ordinary usage of the term but rather a sort of alpine hut where visitors could get sleeping accommodation and simple meals. The hut accommodated about twenty-five visitors and was served by a weekly steamer from Tromsø. A small vessel was kept in Spitsbergen to take the visitors to various places up and down the coast. Several naturalists and amateur explorers took advantage of the opportunity this enterprise afforded to get some acquaintance with the Arctic regions. The situation was fairly well chosen since all the immediate vicinity is free of glaciers and easy to traverse in any direction. In suitable weather there is no great difficulty in traveling on foot from Advent Point to any part of the interior of central Spitsbergen south of Icefjord. The hotel and the weekly service of steamers were continued in 1897. The *Spitzbergen Gazette* was published weekly from the hotel that year. As a

further attraction to tourists a set of Spitsbergen stamps was printed. They were of pretty designs and well executed, and though of course without value for franking letters, except on the Company's vessels, they had a ready sale in Tromsø. However, this was the last season of the hotel. For some years it stood empty and then was sold to the American Coal Company, which removed it to Longyear City for use as a warehouse.

For a period the tourist traffic did not flourish, and when it revived fell largely into German and Norwegian hands. There were occasional French and a few Austrian, but the British boats dropped out. German competition probably drove them from the trade, for the German boats which sailed from Hamburg took to calling at Leith on the way north via the Faroes, Iceland, and Norway. The Norwegian steamers for the same reason gave up their call at Newcastle, and abandoned Hamburg as their port of departure, sailing direct from Bergen and other Norwegian ports. The voyage was not without risk, chiefly on account of uncharted rocks. If a large liner had struck one of these it would have gone badly with her passengers. To obviate this danger as far as possible the Norwegian boats always sail two together. Among the allurements offered to the tourist was the prospect of a glimpse of the polar pack-ice. This inducement tempted many to make the cruise, and no doubt some have been satisfied with the result. But an unprotected liner is not a suitable vessel for cruising in among ice. Once the captain sighted the pack he turned the vessel without

further delay : the tourist's glimpse was a short one. There have been occasions when these boats have reached a high latitude in an ice-free sea : on one occasion a tourist vessel got as far as lat. $81^{\circ} 40' N$. The Norwegian boats being smaller than the German were able to visit more bays, and they generally went up Icefjord as far as the Post Glacier and Temple Mountain, and then went on to Cross Bay and Virgo Bay. Green Harbour, with its wireless station, and Advent Bay, with its coal mines, were regular ports of call.

A favourite practice of the tourist boats was to erect a monument on some conspicuous point to commemorate the visit. Needless to say this curious foible appealed especially to Germans. Advent Point is a veritable cemetery of such monuments, elaborate iron structures brought from Europe for the purpose and firmly planted in stone bases. The erection of the monument used to be an occasion for some ceremony and much noise. A favourite time was midnight : possibly that hour lent solemnity and uniqueness to the event without of course depriving it of the advantage of daylight. An onlooker describes how several boatloads of bottled beer were first brought ashore : then the ship's band followed, and lastly came the passengers. To the sound of tunes of the Fatherland, patriotic toasts were freely pledged. The monument was then put in place, with its inscription recording the important event. The passengers re-embarked and the vessel continued its voyage.

It used to prove quite amusing to watch tourists

landing for sight-seeing. Many of course were reasonable beings who had no desire to attract attention. But there were others who were a joy to see. Clad in furs, and armed with knives or pistols, some stout Germans evidently expected to be assailed with polar blizzards and attacked by bears—or was it done for the sake of being photographed “within six hundred miles of the North Pole”? Needless to say no Norwegian tourists behave in this ridiculous fashion.

This traffic in tourists should revert to our country now that the Germans are driven from Spitsbergen. There is plenty of room for several large British steamers in the trade without interfering with the Norwegian vessels, which will of course continue. The vessels of the Norddeutscher Lloyd used to stay about ten days in Spitsbergen, and the passage each way, allowing for several ports of call, took about two weeks. This German company made a claim to land in Cross Bay with a view to building a large hotel. A British company might do worse than adopt the suggestion. Good sites abound: perhaps the best are well up Icefjord, where sea mists are not so frequent as on the west coast. Such an hotel, catering for tourists who are prepared to spend a good deal on a short holiday under novel conditions and in the purest air in the world, should pay well, even though it would be in use only for some four months in the year. About a thousand to two thousand tourists used to visit Spitsbergen in busy seasons. More steamers, more advertising, and a good hotel would double these numbers.

At least one excursion of scientific tourists has visited Spitsbergen. That was in 1910, when a few score of the members of the Eleventh International Geological Congress, which met at Stockholm that summer, embarked at Narvik for a short trip to Icefjord and Horn Sound to get a glimpse of the geographical features of Spitsbergen.

Many tourists and sportsmen also come to Spitsbergen in their own yachts. It was the Marquess of Dufferin and Ava, then Lord Dufferin, who set the example in 1856 when he went north in his schooner-yacht *Foam*. It was an adventurous voyage for an amateur sailor to take a sixty-ton yacht among polar ice, for the conditions of navigation in the Greenland Sea were less understood then than they are to-day. Lord Dufferin had an exciting time searching for Jan Mayen after he left Iceland, but it did not satisfy his love of adventure; so after calling at Hammerfest he sailed for Spitsbergen. Meeting the pack at Bear Island the *Foam* had to sail west and north, and ultimately, after much difficulty, found a way through past Amsterdam Island and the Seven Glaciers to English Bay or Cove Comfortless. In his *Letters from High Latitudes* Lord Dufferin describes his impressions of Spitsbergen. He comments on its marvellous stillness: "ice, rock, and water surrounded us; not a sound of any kind interrupted the silence; the sea did not break upon the shore; no bird or any living thing was visible; . . . no atom of vegetation gave token of the earth's vitality: a universal numbness and dumbness seemed to pervade the solitude." This is very true of certain bays, of which English

Bay is one : there is no bird life, no reindeer, no foxes, and so little vegetation that it is scarcely visible. English Bay is one of the anchorages which seem to overawe one and dwarf one's ship : perhaps because it is so much enclosed. But Lord Dufferin was prepared to be impressed by Spitsbergen. " No description can give an adequate idea of the intense rigour of the six months' winter in this part of the world. Stones crack with the noise of thunder ; in a crowded hut the breath of its occupants will fall in flakes of snow : wine and spirit turn to ice : the snow burns like caustic ; if iron touches the flesh it brings the skin away with it : the soles of your stockings may be burnt off your feet before you feel the slightest warmth from the fire ; linen taken out of boiling water instantly stiffens to the consistency of a wooden board : and heated stones will not prevent the sheets of the bed from freezing." Evidently this picturesquely terrible vision of a polar winter was inspired by the logs of the early winterers at Smeerenburg : it took no account of the Russian experiences of the period. But if Lord Dufferin imagined a winter in the Arctic to be even half as terrible as he suggests he was a brave man to run the risk of it as certainly he did when he took the *Foam* northward. About half a century later, in walking along the shores of English Bay, I chanced on a stone on which had been cut "*Foam, Schooner Yacht, Lord Dufferin, Charles Fitzgerald.*" We replanted the stone on top of the cairn from which it had fallen, but found no trace of the tin box which Lord Dufferin records having placed among the stones of the cairn.

A few years after the visit of the *Foam*, James Lamont began a long series of visits to Spitsbergen in the *Genevra* and later in the *Diana*. Lamont's object was hunting, to which he devoted most of his attention, generally visiting Storfjord, Edge Island, and islands in the vicinity. To Lamont we are indebted for some of the best observations on the animal life of Spitsbergen, and for several delightful volumes of sport, adventure, and reflection. Lamont's discovery of coal in Advent Bay in 1859 must not be forgotten, or his correction of the position of Hope Island, which used to be about one hundred miles out of its true place on the chart.

It would serve no purpose to record all the yachtsmen who have visited Spitsbergen on sporting or other ventures. Some did no good in their ruthless slaughter of game, and disgraced the name of sport. Others with considerable enterprise did a good deal of exploration, or at least carried naturalists with them, and so added to our knowledge of Spitsbergen. Foremost among the explorer yachtsmen was Benjamin Leigh Smith. His first visit to Spitsbergen was in 1871, in the yacht *Sampson*, and his last in 1880, in the *Eira*, the vessel that was a year later crushed in the ice at Franz Josef Land and sank leaving Leigh Smith and his companions stranded for the winter. But the voyages of Leigh Smith are better considered in their place in the story of the exploration of Spitsbergen. Also important from a geographical standpoint was the voyage of Mr. Arnold Pike and Sir Savile Crossley in the yacht *Victoria* in

1897. Sir Henry Gore-Booth, in the *Lancashire Witch* in 1888, managed to reach the North Cape of North-East Land, which was no mean feat of navigation for a vessel of that unprotected nature. The explorations of the Prince of Monaco in his yacht the *Princesse Alice* are mentioned elsewhere. The yacht *Fleur de Lys*, with Prince Henri de Bourbon, was in Spitsbergen waters in 1891 and 1892. Surveys of several harbours were made, but they have not stood the test of subsequent examination and, though incorporated on some of the British Admiralty charts, they should be discarded.

Among naturalist yachtsmen, in addition to those already mentioned, have been Mr. E. Birkbeck and Professor A. Newton, who in the *Sultana*, a frail vessel ill-suited for ice navigation, made observations on the birds of the little-known east coasts in 1864; Mr. A. H. Cocks, who did zoological work in Icefjord; Colonel H. W. Feilden, who added to his wide researches in Arctic botany and natural history by a visit to western Spitsbergen in the yacht *Saida* in 1894; Major Andrew Coats, who cruised along the east of Spitsbergen in *Blencathra*, and the Earl of Morton, who in the steam yacht *Cressida* in 1906 investigated the mineral resources of Icefjord and King's Bay. The Duke of Orleans made several deep-sea exploring expeditions to the Greenland Sea, but his work scarcely touched Spitsbergen. It is of interest, however, to note that his vessel was the *Belgica*, which some years previously had been the first vessel to spend a winter in the Antarctic. In later years the *Belgica* reappeared in Spitsbergen

bringing workmen to the coalmine in Longyear Valley.

While luxurious voyages of this nature have, with the exceptions mentioned, been generally under the flags of British yacht clubs it must not be forgotten that naturalists of other countries have frequently pursued their researches in Spitsbergen under more modest conditions of travel, either hiring a Norwegian sloop or taking advantage of some tourist boat to get a passage north. Among British subjects occur the names of the Rev. A. E. Eaton, Mr. V. H. Gatty, A. Chapman, Rev. Mr. Bonnar, and among Germans those of Leo Cremer, W. Kükenthal, and F. Römer. The Austrian, Dr. Richard Drasche, discovered marble on Prince Charles Foreland.

A few miscellaneous voyages of interest which find no special place in the history of Spitsbergen exploration may be mentioned here. The Arctic regions, despite the part which naval officers and naval expeditions have taken in their exploration, are generally considered outside the scope of cruises of men-of-war. In another chapter the visits of Dutch and Russian cruisers to Spitsbergen are mentioned: no doubt before long tales of British cruisers in those waters will be made known.

However, as long ago as 1895, the British Training Squadron, consisting of H.M.S. *Active*, *Volage*, *Ruby*, and *Calypso*, and under the command of Commodore G. L. Atkinson, made bold to sail north from Norway and reached Bell Sound, where they spent a few days enjoying themselves and incidentally verifying the excellent French chart of Recherche Bay. Their

only record, in addition to a monument on the beach, was the name Training Squadron Island, a monstrous label to affix to a tiny islet in the bay.

A voyage of a different nature was that of the Russian ice-breaker *Yermak* in 1899. The *Yermak* had been built at Newcastle-on-Tyne for use in clearing the port of Petrograd in winter and for keeping open a passage through the Kara Sea in summer. On her trial trip she steamed through 160 miles of ice from Reval to Petrograd without difficulty, but Admiral Makaroff, her designer, wanted to try her in heavy polar ice. For this purpose the *Yermak* was taken to the north-west of Spitsbergen and made her way into the pack, north of the Seven Islands. The experiments on the whole were successful, ice 14 feet in thickness being broken when charged by the ship. Provided only that there was room for the broken pieces the vessel could thus make her way through heavy floes. In loose pack progress was easy, but so it would be for a strong wooden vessel. The real difficulty in ice navigation is to devise a ship that will be safe in heavy pressure when the wind drives the pack against the land. Under these circumstances a vessel that does not lift and escape the pressure by allowing the pack to meet under her keel will ultimately be crushed. A concrete memorial of the visit of the *Yermak* to Spitsbergen stands on the shore of Advent Bay. This voyage had no direct geographical results. Admiral Makaroff reported new land far to the north of the eastern end of North-East Land, but he did not approach nearer than

one hundred miles to his discovery. There seems to be no doubt that he was mistaken, being deceived probably by a mirage or low cloud effects on the horizon. Yet the recrudescence of this elusive land was not without interest.

XVIII

AN ADVENTUROUS VOYAGE

NEAR as Spitsbergen is to Europe there is no regular service of steamers. The traveller who wants to go north finds his way to Tromsö and then looks about for a vessel. He may find a collier or a store-ship going up to a mining camp that is willing to give him a passage. If he likes luxury a tourist boat may serve him, but their accommodation is generally all booked at their port of departure by travellers making the round trip. There remains the possibility of chartering a fishing sloop or getting a berth on the post-boat which now and then visits Green Harbour. There is no luxury and little comfort on this vessel. Some years ago, when an old sealing sloop served the purpose, I made the voyage to Spitsbergen on the post-boat. We were in a hurry to get north and took this vessel, as it was due to sail several days before a steamer on her way to Advent Bay to load coal.

The *Dion* was only 48 feet from end to end and had a beam measurement of 16 feet. She drew about 9 feet and had a displacement of 23 tons. Blunt-bowed and with a rounded stern she was anything but graceful, and her two short masts and horizontal bowsprit did not add beauty to her appearance. But

there was compensation in her great strength. Her ample timbers had proved their worth in seven years of buffeting on the fishing grounds of Norway, where the sea is seldom gentle and frail boats have no value. A forward fo'c'sle, a hold most of which was occupied by the motor engine, and a tiny cabin aft was all the accommodation. The cabin, which was three-quarters sunk below the deck, was just under six feet high and five feet wide. Along each side ran a narrow bench, behind which were the bunks, one on each side. These were the only parts of the vessel where one had no feeling of being cramped for want of space: in fact they were far too wide for comfort when the boat was rolling violently. Between the benches was a small table surmounted by a gorgeous mirror and an aneroid barometer. At the opposite end of the cabin, beside the ladder to the deck, was a small stove. Light we got through the glazed skylight: lamps were not required as we were in a region of perpetual summer daylight. Two men and two boys comprised captain and crew, but the captain seemed to do most of the work, including the cooking. The boat was his and he was sure of her in any vagary of the sea. Captain A. Aarensen was a splendid type of Norseman, tall, strong, capable, and fearless, and at the same time a well-educated, thoughtful man. He had spent years in large American sailing ships in the Pacific but, as he explained to me, he tired of the blue skies and warm weather and came back to the grey seas and mist and ice he loved so well.

In addition to our camp equipment and stores, which included a small boat, the *Dion* was carrying

to the wireless station some cargo, which included several barrels of paraffin, one of which sprung a leak during the voyage, with the result that our cheese and bacon acquired a strong flavour, which we eventually got accustomed to but never relished. Luckily the biscuit and oatmeal were in sealed tins. The mails the *Dion* carried could hardly be described as cargo, consisting as they did of one small bag.

The hour of sailing had been fixed for late on Saturday night, but unmistakable signs of heavy weather out at sea had made the captain delay till Sunday. It was a drizzling, cheerless morning when we went aboard. Tromsö looked homely and safe, and our boat seemed very small against its background of mist. There was little astir in the harbour as the *Dion* puffed noisily down the fjord. The *Herzog Ernst*, with the German Arctic Expedition, was lifeless: a Sunday calm reigned on the cargo boats, and even a big Hamburg-America tourist boat which had just arrived showed no animation. The *Dion* alone broke the silence as we passed at a bare four knots into the mist and headed north leaving civilization behind us. We continued our slow progress through the fjords all day. The mist hung low, and there was little to see except an occasional passing boat. Towards evening, as we approached the end of Hammarfjord it was clear that a stiff north-easter was blowing outside. We could see the breakers foaming on the reefs, and here and there we felt the force of the gale. So we anchored for the night under the lee of Vannö, about a mile from the shore. It was pleasant to see a few farms and green fields in

this wild waste of sea and hills, and the sight of people moving about on shore gave a note of cheerfulness to our anchorage. The morning was bright and windy, but the gale had spent its force. We continued on our way, but before standing out to sea anchored in the little haven of Torsvaag in order to get breakfast in peace. Behind a small rocky island, in the shelter of Vannö, lies an ideal anchorage. In spite of a strong north-east wind blowing out at sea, there was complete calm in this haven. Not the slightest air ruffled the glassy surface of the water: in four or five fathoms the bottom was perfectly distinct. In the absence of wind the sunshine was deliciously warm. Some seven or eight graceful Russian sloops and a small coasting steamer lay in the harbour. The village consists of six or eight houses, the occupants of which are all engaged in fishing and the curing of fish. Most of this is exported to Russia, and hence the number of Russian vessels at anchor. Here we were able to send a last telegram and post our last letters before passing out to the polar seas. Through a dangerous rock-ridden passage the *Dion* was navigated seawards, sail was set, and soon we were running north at five knots, with a strong breeze abeam. The *Dion* began to roll and pitch, for the previous night's sea had not yet subsided, but, as the day wore on, both sea and wind dropped. Next day we met the fog bank so habitual round about Bear Island. Anyhow, we never saw that dreary spot as we slowly plodded onwards with the help of the motor. On the night of Wednesday it began to blow from the east again—a fair wind:

we congratulated ourselves on our luck. But our joy was premature: an ugly sky and a tumbling barometer spoke of dirty weather before long, and sure enough it came. On Thursday our position was a matter for speculation. A fleeting glimpse of the sun at noon from a violently pitching vessel, swept incessantly with sheets of cold spray, does not give a dependable latitude. Dead reckoning put us further north, nearer to the entrance of Icefjord. The prospect of getting into shelter was tempting, but there was far too much uncertainty regarding our whereabouts, and too great a certainty of a forbidding coast-line, hidden somewhere in the pall of cloud, to the east.

The *Dion* was put about and stood out to sea. The breeze had freshened to a hard gale and was going round to the south. Before long we were hove to, drifting before the wind, safe enough from rocks and unknown coasts, but tossed madly to and fro in the boiling turmoil of sea.

The deck was fairly uninhabitable: in any case one had no desire to remain there. The cabin was far from comfortable, but it afforded shelter even if it was not water-tight. We were on the starboard tack, so Bruce, who occupied the port-side, suffered most, especially when the tiny glass-topped skylight was carried away and a sea filled his bunk. We could get no food, except a few biscuits, for there was no possibility of using the stove in such weather, even had the captain, who acted as cook, been able to leave the deck for any length of time. There was nothing for it but to lie and dream away the mono-

tonous hours, for there was monotony even in the *Dion's* mad antics. They ceased to be of interest: the novelty of the situation wore off, and existence was simply a tiresome wait for something new to happen. To watch the barometer was the only occupation that was possible or offered the smallest interest. To think of pleasanter scenes and happier days was only to increase one's discontent, and it was with an acute sense of misery that one awoke from a day-dream of some sunny land to a realization of the moment. The only consolation was that it might be a great deal worse and that every hour that dragged its weary way past brought us was nearer to the end. True, one gale might follow close on the tail of this one—such things are not uncommon—but sufficient for the gale is the misery thereof. And possibly we might be disabled or lose a man overboard, and meet with ice, but why think about these things? Time enough if they happened.

On Friday the gale went round to the south-west, blew with redoubled fierceness, and cruelly hammered our little vessel. And so the dreary day wore on: we were accustomed to the wild movement, the ceaseless hammering, and the rush of the waters. There was no reason to suppose the little vessel would not weather it, so despite the discomfort one could be quite hopeful of the morrow. At length on the Saturday things improved. We got sail on the *Dion* and set our course eastward for the land, hoping if the weather remained clear to sight the entrance to Icefjord before long. Fog was now the enemy we dreaded most: having only the vaguest

idea of our whereabouts, we wanted clear weather to make our landfall. This time we were fortunate, and at length, long after we had expected it, Spitsbergen came into sight fully sixty miles ahead. It took us some hours to identify the coast-line. It certainly was not the entrance to Icefjord, nor was it Prince Charles Foreland. As we got nearer it proved beyond a doubt to be the land just north of Horn Sound. The last two days had played some strange tricks on the little *Dion*. There was now no possibility of getting into harbour on Saturday. If the fine weather held we would be in on Sunday, but another gale with thick weather would keep us outside for a few days more. Our vessel was too low-powered to risk such a dangerous coast as a lee-shore.

The wind dropped light, and we started the motor. The sea was now calm and its placidity was increased by streams of loose pack which we met. But they offered no difficulties to the *Dion*, although we had to take care that the propeller did not strike. All Saturday we steamed slowly northward keeping the land in sight about ten or twelve miles off. Near Bell Sound we spoke a hunting sloop which had been badly battered in the gale and wanted needles and thread to repair her torn mainsail. By evening we sighted Icefjord and still the weather remained favourable, but we had learnt by now not to count our chickens, so we turned in on Saturday night with no sanguine hopes of where the next day might find us. However, for the time being our troubles were over. Early on Sunday morning we entered Icefjord, rounded the corner in Green Harbour, and at 8 a.m.

let go our anchor opposite the wireless station in the lee of the point. The Spitsbergen mail had arrived in port.

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It was pleasant to lie again in a peaceful anchorage, but pleasanter still to think that despite delays we had reached Spitsbergen. Drear and misty as the weather was, the shores of Green Harbour looked quite hospitable after the week of sea. And here was quite a centre of activity and civilization with the whaling station, telegraph office, and coal mines.

XIX

THE MINERAL WEALTH

THE modern history of Spitsbergen is the outcome of its mineral wealth. Some knowledge of the occurrence and distribution of the minerals and rocks is necessary in order to understand the location of the various estates.

The geological structure of Spitsbergen is complex and further exploration is likely to increase its complexity. Many details have yet to be filled in, but the main features of the structure of the land and the distribution of its rocks are known. Broadly speaking two regions may be contrasted, the region of older rocks with few minerals and the region of newer rocks in which many minerals occur.

This system, known in Spitsbergen as the Hekla Hook system, represents old mountain folds which probably at one time were continuous with the mountain ranges of the Scandinavian peninsula. The Hekla Hook system was partly denuded in the course of time and partly overlaid in the Devonian period by sandstones and shales. These were raised above sea-level by a later elevation of the land, which was particularly pronounced in the north of Spitsbergen. Then at a later period upon the denuded and afterward depressed Devonian rocks were laid

down in succession Carboniferous, Permian, Triassic, Jurassic, and Tertiary beds, which in their turn were elevated and now form the almost horizontal beds of central and east Spitsbergen. There has been little folding in these beds to disturb the original uniformity, but great faults or cracks formed which led to the foundering of certain great areas and the formation of the great fjords, which were subsequently scoured out by the action of glaciers.

The region of old rocks, Archæan, Silurian, Ordovician, and Devonian, is found in a band along the west coast ten to twenty miles wide, extending from South Cape to Vogelsang, and includes Prince Charles Foreland. North of the latitude of English Bay it covers practically the whole country, including North-East Land and outlying islands.

The region of newer, Carboniferous, Permian, Secondary and Tertiary, rocks covers the rest of the country. It is best represented and certainly best known around Icefjord, which forms the great highway to the heart of the country. Newer rocks are found on both sides of Storfjord in the east, including Barents and Edge Islands.

Small isolated areas, outliers, of newer rocks occur in certain places in the older rocks of the west coast, such as in Prince Charles Foreland, in King's Bay, and at the mouth of Bell Sound.

The contrast between the regions of older and newer rocks is seen in the scenery. The older rocks, turned on edge by earth disturbances, present now a series of sharp peaks, the needle-shaped summits which gave the country its name. The newer rocks,

on the other hand, lie in more or less horizontal strata, forming a plateau region in which flat-topped mountains are separated from one another by deep, wide valleys.

Furthermore, the region of newer rocks, especially in the centre of the country, is comparatively free from glaciers: its valleys, opening to the long branches of Icefjord, give easy access to the country and facilitate mining.

The newer rocks comprise most formations, from Carboniferous to Quaternary. The best represented are strata of rocks of Carboniferous, Permian, Jurassic, and Tertiary (chiefly Miocene) Ages. Triassic rocks are of small extent but not without importance. Opinion is still divided concerning the distinction between Carboniferous and Permian strata, as represented in Spitsbergen. They are frequently termed Permo-Carboniferous, although the weight of evidence tends to place them in the Carboniferous era. But these are questions of little economic importance.

Among such a variety of geological formations it is not surprising that a large number of minerals occur. The future probably holds further discoveries in store, since many regions have not been examined in detail by competent geologists.

The principal mineral is coal. It occurs in several formations, Permo-Carboniferous, Jurassic, and Tertiary. In most countries the best coal is of Carboniferous Age, but in Spitsbergen this is not the case, the Tertiary coal being the best.

Carboniferous coal occurs mainly in the heart of Spitsbergen, at the head of Icefjord. In Klaas Billen

Bay it comes to the surface, and in Mimers Bay there is a small Swedish mine. It probably has a wide extent at or below sea-level from Klaas Billen Bay to Temple Bay and beyond—a vast territory held by a British company. The whole extent of the Carboniferous coalfield may be 240 square miles, and its total content some 6,000,000,000 tons. A few outliers of this coal occur near the west coast and have given origin to more than one tale of rich coalfields. A Russian company has been doing a little work on a small outcrop near the entrance to Green Harbour, and the coal is also found on the north of Lowe Sound. In Icefjord the main seam is about six feet thick, but the coal is shaly and not of great value. Carboniferous and Devonian coal occurs also on Bear Island, where a Norwegian firm has recently done a little mining. The Bear Island coalfield covers about thirty-three square miles and contains some 8,000,000 tons of poor coal.

Jurassic coal is probably more widespread, but as a rule not very accessible. In many places it is below sea-level and generally it is capped by Tertiary rocks, with their more valuable coal. In Advent Bay the coal seam is about four feet thick but much faulted, and the coal is not a high quality, being the poorest of all Spitsbergen coals. It is estimated that the Jurassic coalfield covers about 230 square miles and contains not less than 750,000,000 tons.

Lastly, there is the Tertiary coal. This is of widespread occurrence in central and southern Spitsbergen, and wherever investigated has been found to be of excellent quality. This is not a little surpris-

ing since coal of that age is often of little value as fuel. The Tertiary coal of Spitsbergen has been proved to be good steam coal with little ash. For marine purposes it is nearly equivalent to Welsh coal. The seam varies a good deal in thickness: in Advent Bay it is $2\frac{1}{2}$ to 10 feet thick, but 4 feet may be taken as an average. It is generally 300 to 400 feet above sea-level, and, like the Jurassic seams, more or less horizontal, and so can be easily and cheaply mined. Most of the known Tertiary coalfields have now been claimed by one or other company, and it is unlikely that any further ones will be discovered. Some 460 square miles is the total area of this coalfield, and this figure, large as it is, has a greater degree of accuracy than corresponding ones for the other coalfields, owing to the Tertiary rocks being well exposed. As to the total content all that can be said is that it is unlikely to be under 2,000,000,000 tons and may be a great deal more.

Tertiary coal is worked at the rich mines in Advent Bay, the Swedish mine in Braganza Bay, the Russian mines on Icefjord, Norwegian mines in Green Harbour, and the British mines in Lowe Sound. A small outlier belonging to a British company is being worked in King's Bay. Another small outlier in Bell Sound, now British property, has been prospected by many miners, but considered too small to be worth working. Other outliers, also British property, occur on the east side of Prince Charles Foreland.

The Norwegian geologist, A. Hoel, believes that certain of these strata, notably in Lowe Sound, are of Upper Cretaceous and not Tertiary Age. Average

analyses of the three kinds of Spitsbergen coal are as follows :—

	Carbon	Hydrogen	Oxygen & Nitrogen	Sulphur	Ash	Calorific Value
Carboniferous	75·7	4·6	9·2	0·5	10·0	7500
Jurassic	76·0	6·0	9·0	1·5	7·5	7375
Tertiary	81·5	3·7	11·6	0·7	2·5	7700

The estimated content of the coalfields of various ages is based on the assumption that the seams maintain the average thickness they show at exposures. It has been argued by people who seem anxious to disparage the mining possibilities of Spitsbergen that this uniformity is not proved. Available evidence, however, supports it. The Tertiary coalfield has been examined in various places, as noted above, and in all of these the same thick seam of high quality coal has been found. This does not suggest that the seam varies in thickness or disappears in parts of the area.

Iron ores are very plentiful in Spitsbergen, in the older rocks of the west. They have not been well investigated, but as a rule seem to be low grade ores, containing only ten to twenty per cent of iron. Ores of that nature could only be worked for concentrates, and it is unlikely that they would prove profitable even with abundant cheap coal at hand for the industry. A certain amount of high grade ore, in the form of magnetite, has been found in Recherche Bay and Prince Charles Foreland. Samples brought to Britain for analysis showed a content of about sixty-six per cent of iron. If these samples are typical of the whole ore body, the deposits are of great value,

and justify the most sanguine expectations. The same ore may very likely occur in other parts of the old rocks of the west coast, and this probability has led to most of the coast regions being claimed by one or other mining company.

Among other metallic ores reported, chiefly from British estates, are copper, zinc, and molybdenum ores. No details as to the extent of the deposits are yet available. Stories of gold must be received with caution. A little alluvial gold may have been found—there are few countries in north-western Europe where this does not happen—but up to the present there is no evidence of any placer gold sufficiently rich to repay working. A few Klondyke miners who worked alluvium in the Sassen River some years ago had no success. Gold-bearing quartz has not been found despite reports to the contrary. Many years ago a wild tale of Spitsbergen goldfields appeared in the English press, but it had no foundation in fact. There have also been tales of platinum, but so far it has not been found, though quite possibly it does occur. Stephen Bennet in 1603 brought back samples of lead ore from Bear Island and reported the occurrence of silver, but neither discovery has since attracted attention. A little poor copper ore was found by Germans in Cross Bay.

Asbestos occurs in Lowe Sound and elsewhere, and was prospected a year or two ago by a certain Norwegian company. It is of good quality, but does not seem to occur in large pieces.

Gypsum is one of the principal minerals in Spitsbergen. It occurs in thick horizontal strata in the

Permo-Carboniferous rocks at the head of Icefjord There are at least seven distinct beds of gypsum of a total thickness of about two hundred feet. The individual beds vary from ten to thirty feet in thickness and are separated by layers of limestone. It is difficult to say what is the total area of these deposits, but it is, at the lowest estimate, one hundred square miles. Samples brought home for analysis showed the gypsum to be the purest in Europe and admirably adapted for the manufacture of plaster of Paris. The whole of these deposits, which are close to deep water and good anchorage, are the property of a British company.

Finally, there is the most important of Spitsbergen mineral treasures, oil shale, and the possibility of free oil. This also lies on a British estate, and the owners were on their way to make further explorations of this property when the outbreak of war compelled the expedition to return.

In addition to minerals there are valuable building stones in Spitsbergen. Marble and breccias of a wide range of colour occur in the old rocks in the north-west, both in King's Bay, on the Foreland, and probably elsewhere. They were quarried and exported for a year or two by a British company and promised to find a ready market.

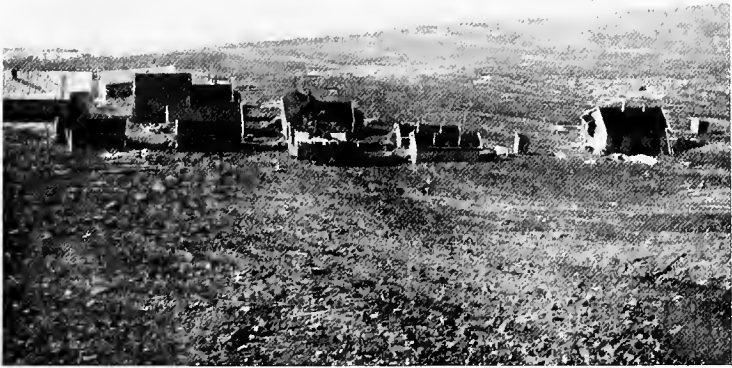
Rich as the mineral resources of Spitsbergen undoubtedly are they have not yet been fully investigated. Many good geologists have worked in Spitsbergen, but their researches have been chiefly devoted to the elucidation of scientific problems. Economic geology is a task for specialists : for these Spitsbergen

offers a wide field of work. Too few have been employed in the past, and too many untrained amateurs have given their opinion on the mining properties. The conclusion of peace will free many mining engineers to take up their own work again. A large number could profitably find employment in Spitsbergen if the mining companies are far-sighted enough to seize the opportunity of securing their services.

XX

PROSPECTORS

A FEW years after the Dutch discovered Spitsbergen, coal was reported. In 1610, Jonas Poole, a Hull walrus hunter in the employ of the Muscovy Company, found "sea-coales which burnt very well" in King's Bay, in a small cove subsequently called Coal Haven. This deposit has since proved to be of considerable value. In the same year Poole discovered coal in Bear Island. Other seams of Spitsbergen coal must have been known at an early date, since there are passing records of whalers making use of them in the seventeenth century, but it was long before the value of the beds was realized. These early discoveries were lost sight of till about a century ago, when Keilhau, the Norwegian geologist, drew attention to the coal. His report resulted in a few small cargoes being brought to the iron mines at Kjöfjord in Finmark. Russian interest in Spitsbergen then revived, stimulated no doubt by the rich trade of the Russian trappers, but a proposal made in Russia in 1830 to investigate the mining possibilities of Spitsbergen failed to evoke adequate response. Nothing serious seems to have been done for many years.



ADVENT CITY.

A British mining camp viewed from the hillside above.



A HUNTING SLOOP.

Note the crow's nest for ice navigation. On the right a small coaling jetty.

Throughout the latter half of the nineteenth century Swedish scientific explorers reported coal in various localities, but made no attempt to follow their discoveries by commercial development. The Scottish explorer James Lamont coaled his yacht in King's Bay and near Advent Point, at the latter of which places he discovered the valuable Tertiary coal. Dr. W. S. Bruce, realizing the extent of the coalfields, brought some samples of Tertiary coal to Edinburgh twenty years ago. Experts reported favourably on the analysis, but commercial men, ignorant of Spitsbergen's accessibility, and slow to grasp the significance of the discovery, refused to be interested. Thus one of the most valuable coalfields in the north of Europe was lost to British ownership.

In the year 1900 the first claim to land seems to have been made in Spitsbergen, if we except the isolated, ill-fated venture of the Swedes thirty years earlier at Cape Thordsen. A Trondhjem company staked out claims to coal-bearing estates in Advent Bay and Green Harbour. From the former place they sent a sample cargo of coal to Norway, but this effort appears to have exhausted the company and nothing more was done for several years. In those days Norway had a clear field in Spitsbergen. There were no rivals of other nationalities to complicate the issue, and if Norway had grasped the value of the country she might have annexed it without protest from any other power. Her proximity and her own want of coal were sufficient incentives to develop Spitsbergen, but for one reason or other

little was done and the opportunity passed. The first Norwegian mining venture was virtually abandoned the year after its inception, and Norwegian explorers and prospectors were practically unknown in Spitsbergen for another five or six years. Meanwhile the neglected coal beds in Advent Bay drew attention from other quarters.

The year 1904 is a memorable one in the history of Spitsbergen mining as it witnessed the beginning of two notable enterprises and the entry of two new nationalities into Spitsbergen affairs. The Spitsbergen Coal and Trading Company of Sheffield was a growth from the Trondhjem company, but it was essentially a British concern, and merits notice as the first serious mining venture in Spitsbergen. Preparations for mining on a large scale were begun on the estates on the north-east corner of Advent Bay. A level adit was run into the hillside at a point about 600 yards from the shore, at an altitude of about 330 feet. The mine was connected by a tramway to a small loading jetty. A dozen well-built log-houses and stores were erected and electric light was installed. One way or another a great deal of capital was invested in Advent City and its mine, but the venture never prospered.

In the busiest season probably one hundred men were employed in and around the mine, and a number of men twice wintered, although one wintering was a fiasco on account of a prolonged strike. One or two yachts and exploring vessels were coaled every summer, but export never exceeded some two

thousand tons of coal a year. Finally, after three years' work, operations ceased on the advice of experts sent to examine it. Undoubtedly there is good coal in the beds above Advent City, but the adit struck a big fault which practically put an end to profitable mining. In other respects, too, the site of the mine had been unwisely chosen. It was very exposed, drifting ice was a menace to the jetty and loading facilities were poor. Finally the better prospects of the new mines across the bay gave the finishing blow to the Sheffield venture. For a year or two a few men were left in charge, and then the whole place was abandoned and became a prey to marauding hunters and other robbers. A few years ago what remained of the property was sold to a Norwegian company and the log-houses were removed to another site.

While this English company was opening its mine, another company was busy on the other side of Advent Bay, near its head. Here the Trondhjem company already referred to had made claims to land and had sold them in an undeveloped state for about £1000 to Mr. Longyear, an American, who was quick to grasp the value of the estates. The Arctic Coal Company of Boston, U.S.A., was soon at work with characteristic American energy. In a sheltered gully at the head of the bay Longyear Valley City was founded, and a coal seam was opened on the hillside four hundred feet above the sea-level. The type of mining was very similar to that employed in the English mine, but the coal was of much higher grade and relatively free from "dirt." A strong jetty was

built in the bay, along which vessels could load, and it was connected with the mine by a wire ropeway, and the settlement by a tramway. This company soon extended its claims until they embraced the greater part of the best coalfield in the country. Capital was lavishly expended on the mine in buildings, machinery, and stores. The company's own store-ship sailed to and from Tromsö and initiated a new departure in Spitsbergen communications by making her last journey late in October every year. Advent Bay, with its two coalmines, became a busy centre and heart of Spitsbergen activity.

The activity of the English and American mines attracted prospectors. From the early years of this century not a summer passes without a dozen or more prospecting parties arriving in Spitsbergen. Some come with well-equipped expeditions, which have among their staff geologists, and other experts competent to examine the ground and choose estates of value. Others are amateurs who arrive in their own yachts, or find their way in some chartered sloop. Many claims are of no value, most are abandoned the year they are made, and a great number have no validity, as they are trespasses on pre-existing claims.

Green Harbour for many years was the happy hunting ground of prospectors. It is easily accessible, and its eastern side contains valuable coal measures. The foreshore is littered with claim boards. The Americans in Advent Bay used to maintain that their estate extended westward and embraced the whole

of the eastern side of Green Harbour. A Norwegian company, called the Green Harbour Coal Company, disputed this, and maintained a prior claim. As there was no way of settling the dispute both companies eventually opened small mines and made a great show of serious operations, which, however, had very little behind them. The Stars and Stripes and the Norwegian flag both made a brave show above the tiny huts on which they floated. Travellers were puzzled to know the rights and wrongs of the dispute when the rival claimants showed the greatest friendliness to one another and neither appeared to be at all in earnest about his mine.

While Advent Bay became the centre of Spitsbergen's early mining life and Green Harbour an active provincial centre, the prospectors did not leave other parts of the west coast alone. The east coast, rightly or wrongly, has a bad reputation for ice, and so received little attention. The first English company was followed the year after it began operations by another. Two Scottish peers, yachting in Spitsbergen waters, erected a number of claim boards at various places, including Coal Haven, where Poole had found coal three centuries previously; at Cape Thordsen, on the site of the abandoned phosphate mine; in Lowe Sound, and elsewhere. It was only in Lowe Sound that developments took place. There the Spitsbergen Mining and Exploration Company for several years had a few men at work on a coal seam, but the mine never reached the stage of export, and ultimately passed into other hands.

Two companies, however, which have stood the test of time emerged from this period of chaos and blind land-grabbing. These are the Scottish Spitsbergen Syndicate and the Northern Exploration Company. As the two chief British mining companies in Spitsbergen to-day the history of these enterprises is not without interest. The Scottish Syndicate was founded in 1909 on prior claims made by Dr. W. S. Bruce and Mr. J. V. Burn-Murdoch. It sent a large and well-equipped expedition, which explored considerable areas before the estates were finally chosen. Since that date frequent expeditions have prospected and surveyed the syndicate's estates. The Northern Exploration Company was started about 1909, by the acquisition of several private claims. In subsequent years it did a good deal of work, and opened marble quarries in King's Bay. Both companies naturally had to suspend operations during the war. Shipping, material, stores, mining engineers, and labour were practically impossible to obtain. Last year the Northern Exploration Company took a new lease of life, under the direction of Mr. F. W. Salisbury Jones, and renewed operations. In 1919 the Scottish Spitsbergen Syndicate resumed work on its estates with a large expedition.

While these events were occurring in Spitsbergen, Bear Island had not been forgotten. In another chapter an account is given of the exploits of the German journalist, Lerner, in 1898 and 1899. His claim was abandoned and the land was ultimately

taken some fifteen years later by a Norwegian company, which has great plans of harbour construction and speaks of a huge output. No one who knows Bear Island, with its iron-bound coasts and its perpetual fogs, believes a word of these hopes. The coal is there, although not of exceptional quality, but the facilities for shipping are so poor that it can never compete with Spitsbergen coal.

Now that nearly all the mineral-bearing lands in west Spitsbergen have been claimed, it might seem probable that the Spitsbergen rush would end. But the contrary is the case. Spitsbergen is only now beginning to find a place in popular geographical knowledge. The rich prospects of some of the mining estates, combined with recent events which have brought the country into public notice, are attracting many adventurous spirits. Mushroom companies with vague claims arise and disappear as quickly. Others retire discomfited when they find that despite the curious conditions of land tenure there is some fixity of titles, and claims cannot be jumped with absolute impunity. Others again realize, before it is too late, that without large capital resources mining in Spitsbergen can never hope to succeed. Some of the ambitious prospectors, anxious to find a sure and quick road to riches, would save themselves much trouble and not a little disappointment by trying to acquire some idea of conditions in Spitsbergen before they set out, or before they launch their proposals on the public.

Lastly, there are the claim-jumpers, who are a

numerous clan. They are conscious of the illegality of their acts, although they not infrequently try to challenge the rightful owners, trusting to the difficulty of establishing titles and the absence of any court of arbitration or appeal.



A BRITISH MINING SETTLEMENT.

This house, at the King's Bay marble quarries, was inhabited during several winters.



LONGYEAR MINE, ADVENT BAY.

Note the wire ropeway from the mine, the coal dump, and the jetty with a vessel loading alongside.



XXI

MINING CAMPS

APPROACHING Spitsbergen through the cold mist that haunts its western coasts the traveller has to tax his imagination to picture any human settlements on its desolate shores. Yet there is scarcely a headland on the whole length of the west coast that does not bear witness, in a ruined hut or a grave, to man's activity in the past. Nowadays other huts are springing up, and in places large mining camps are growing, for Spitsbergen is far from being uninhabitable.

Like mining camps in other lands those in Spitsbergen begin with a single hut built on the site of some prospectors' tent, but always near the sea, at a point where there are the best loading facilities in the vicinity of the mineral seams. There are many isolated miners' huts along the west coasts, some destined to mark the site of future busy settlements, others built rather to maintain a claim to land than for any further use. Many of them have their names, by which they are known up and down the land, the Swedish house, Bruce's hut, Auld Reekie, and so forth.

The most imposing of all these scattered houses is the so-called Swedish house at Cape Thordsen in

Icefjord. This marks the site of the earliest mining venture, and, strange to say, of the newest enterprise in Spitsbergen. As long ago as 1872 a Swedish company was formed to dig phosphates in some curious nodules embedded in a hillside in that locality. They built a large two-storied house on a somewhat swampy site, but having one of the finest views in Icefjord. A tramway was laid across the peat-bogs to the sea and preparations were made for starting work on a large scale. The content of phosphorus, however, proved small, and the venture, promising no prospect of success, was abandoned the same year. The house is still standing, though in bad repair, and has been used on several occasions. In 1882-83 a large Swedish meteorological expedition wintered there. Among its staff was Andrée, later to achieve fame and to meet his death in another Spitsbergen adventure. This expedition enlarged the house, set up a windmill on the cliff above to supply electric light, and built several observatories. The ruins of these huts, with their curious dome-shaped roofs, have puzzled many visitors who were unfamiliar with their story.

It was no doubt the Americans who introduced the term city for the mining settlements of Spitsbergen. Nowadays the name is generally used by all the mining companies, though the Scandinavians have naturally been slow to adopt it. Advent Bay remains the centre of Spitsbergen life, but the capital, if one may use the term, has moved from Advent City up the bay to Longyear City. During the war this settlement passed from American to Norwegian

hands, but it has changed little, and a description of life in Longyear City, as it was a year or two before the outbreak of war, will perhaps not be amiss. The jetty is heaped with coal and as grimy and workman-like as any coaling jetty in a Fifeshire coal-port. A steamer lies alongside receiving an incessant stream of coal from the buckets of the mine ropeway overhead. At the shore end of the jetty is the store of coal, mined during the winter, some five to ten thousand tons in the American days, and probably more in recent years. Stacks of timber and heaps of stores lie waiting for removal to the city, when the rush of the summer export season is over.

Following a rough track and tram-line for a few hundred yards across bare, stony ground we reach Longyear City. It contains one wide "street," along which are built the houses of the miners, at one end near the sea the villas of the mine managers, foremen, doctor, and engineers, at the other the barracks of the miners. The villas have a bright appearance, with their clean wood walls, red roofs, and bright curtains, but the barracks are somewhat grim and unattractive. Conspicuous among the buildings used to be a solidly built log-house, used partly as a store and partly as a shop. It was originally put up at Advent Point, about 1896, as the tourist hotel already mentioned. Cattle are kept in stables and supply milk all the year round, poultry run about the city apparently quite happy in their new abode, a pig or two is to be seen, and several ponies are grazing on the short grass of the tundra.

The houses are lit by electricity, and water is led in pipes from a glacier stream higher up the valley. In winter, of course, it has to be obtained by melting snow and ice. The population naturally consists mainly of men, but one or two of the engineers and the doctor used to have their wives with them. There are already half a dozen or more children who claim to be natives of Spitsbergen.

It would be a great mistake to picture this community undergoing hardships in their polar home. To some it may seem a privation to dispense with letters and newspapers for eight months in the year : but such people do not elect to live on the frontiers of the world. A wireless station keeps touch with Europe. In summer there are frequent mails, and the chance of a quick and easy visit to civilization. Practically all food has to be imported now that reindeer are scarce, but the climate makes cold storage easy and does away with the necessity of living on tinned meat. The hospitable Americans used to regale their visitors with fresh beef and potatoes, new baked bread, butter, cranberries, and unlimited milk.

A doctor is attached to the settlement, but as far as disease goes he has little or no work. On some occasions, however, he has had to succour a hunter who, stricken with scurvy, has made his way from some far distant hut, in order to get medical aid. Needless to say, the miners, with their ample fresh diet, never show the least symptoms of scurvy.

The inhabitants of these Arctic mining camps like the life. Not a few of them have voluntarily stayed several years continuously. Many of them, on their return to civilization, suffer from the same complaint as polar explorers, the intense longing to return to the Arctic wastes and stillness. The winter is monotonous if there is not plenty of work. A mining company on Bear Island proposes to build a kinematograph theatre to provide amusement for the miners. But summer, with its ceaseless daylight, brings its compensations. Spitsbergen then becomes lively and there are visitors every week. Often one may see half a dozen or more vessels lying at anchor in Advent Bay : tourist boats, yachts, exploring expedition vessels, hunting sloops, and colliers waiting to load. The tourists overrun the city, eager to see and photograph everything, and they even succeed in buying and posting picture postcards.

The log-houses of Advent City, which was deserted several years ago, have now been moved further up the east side of the bay and re-christened Hjorth City. There another busy settlement may grow in a few years' time.

Green Harbour, where the Norwegian high-power wireless station is situated, used to be an animated centre, but now that the whaling stations are closed it has relatively few inhabitants. Many ships, however, visit it to make use of the telegraph and the post office. Perhaps in years to come the whalers will start again, and Green Harbour once more will have its characteristic smell that almost guided one to the anchorage. It is more likely, however, to

become a mining centre for the good coal is near to secure anchorage, and Green Harbour is seldom obstructed by ice in summer.

In recent years Bell Sound, with its tributary bays, has again become busy. Recherche Bay was of old a veritable playground for prospectors of the less serious type, but now a British company has undisputed claims to all the shores. It is in Lowe Sound, however, that this company has selected a site for its headquarters, on the site of English coal workings of many years' standing. Davis City, as it is to be called, was only founded last year and is still under construction, but some fifty men spent the winter there in charge of that experienced Antarctic explorer, Mr. Frank Wild. At the far end of Lowe Sound, the longest arm of Bell Sound, is Braganza Bay, where the Swedes have got in to the back of the Tertiary coal-beds. The Swedish camp is some years old and growing steadily. Already it makes a brave appearance, with its well-built houses, railway track, and long loading jetty.

In the north the life of Spitsbergen centres round King's Bay. Before minerals were the lure that drew men to the Arctic it was the north-west corner of the country that was busiest. But the old rocks of that region promise no return to the prospector, so the north in these days is left alone. On King's Bay for ten or more years there has been a small camp at Port Pierson, where a British company has been engaged in marble quarrying. For some years, however, it has been deserted, and a new settlement has sprung up opposite in Coal Haven. Other small

settlements of not very vigorous growth are the Swedish camp at Mimers Bay, with a few houses and a short railway, and the rather ramshackle camp on the estate of the Russians in Icefjord. All these, however, are small places and cannot rank among the "cities" of Spitsbergen.

Each of these mining camps is self-contained and dependent only on Europe for supplies. There is little traffic from one to another, but wireless telegraphy keeps them in touch. In time to come it is not unlikely that the number of cities will largely increase. The chief advantage that Spitsbergen offers to the miner is the close proximity of the minerals to good harbours. The result will be that mining camps will arise on most of the good harbours of the west coast and a few on the east coast. Costly land transit will thus be avoided.

Naturally there are many opinions as to the best type of house for Spitsbergen, though all authorities agree in using timber. Log-houses are very serviceable but have the drawbacks not only of being costly but of requiring expert workmen to erect them. The bulk of the necessary material adds to the cost of transport. Houses built of planks serve well, but are useless on account of the cold unless double-walled. The intervening space may be filled with sawdust, but this is not essential: if left empty the house is equally comfortable. Mr. Ernest Mansfield, who has had experience of many Spitsbergen winters, always banked up his houses with stones and moss to the level of the windows. This bank helps to keep them warm in winter and by freezing solid

holds the house steady in the heaviest gales. As deep foundations are not required if the right kind of ground is chosen such plank houses are easy to construct, even without the help of experienced workmen.



LONGYEAR MINE, ADVENT BAY.

The wire ropeway leads from the coal mine to the loading jetty. The settlement is to the left beyond picture.



TOURISTS' MONUMENTS AT ADVENT POINT.

Every German tourist boat used to erect a monument to record its visit.

XXII

MINING CONDITIONS AND MARKETS

WHEN the minerals of Spitsbergen first began to attract attention the practice of prospectors was to erect notices on the land they claimed and often to supplement this claim by building a small hut as a base of operations. Later it became the practice, which is now always adopted, to send to the Foreign Office of the miners concerned a formal notification of the claim. Had the various Governments concerned been zealous of supporting their subjects' rights, this plan might have proved satisfactory. But in actual practice it left scope for unscrupulous adventurers, and led to abuses. It is doubtful if any chancellery in Europe contains a single official well versed in Spitsbergen affairs or even moderately acquainted with the geography of the country, certainly none who has personal knowledge of its peculiar conditions. Precedent, the infallible refuge of the official mind, cannot be evoked in the settlement of Spitsbergen problems, for modern history contains no other instance of commercial rivalry in an ownerless land.

There are several cases of rival claims, and though the settlement may seem simple to those who know the country and its history, there is no authority with

power to adjudicate. International correspondence and exchange of notes is too slow a method to satisfy modern commerce and is often merely an elaborate way of shelving the question. Such problems increase year by year as the more valuable land is occupied. Several instances have been cited in another chapter of overlapping claims. During the war British companies have had much unpleasant experience of trespass on their mining rights.

The question also arises continually of what constitutes a claim to land and under what condition can such a claim be said to lapse. No one paid much attention to this question in the early days of mining when there was room for all. Now, however, the question is more acute. Custom used to decree that a claim to an estate of reasonable area was valid if it trespassed on no other rights and was prospected within a year or two, even if mining operations did not begin at once. In the absence of any authority there was, of course, no law to this effect. It is a moot point to what extent the various successive claimants of Cape Thordsen have been justified in their action. The Swedish company abandoned the land in 1872 and went into liquidation. This presumably released the land and justified the English claim of 1905. Did failure to develop the estate invalidate the English claim and justify the alleged German one of 1916, or the new Swedish one of 1918? A Norwegian company in 1912 annexed certain estates previously claimed and developed but since deserted by a British company.

Neutrals alone have been in a position to develop

their territories during the war, and they have taken full advantage of the absence of British competitors, even trying to maintain that failure of the British to visit certain estates during those years has invalidated British claims. This preposterous suggestion should have been firmly refuted by the British Government. If it were held to be sound more than one of the present companies would find its titles open to dispute.

The state of anarchy which reigns in Spitsbergen has further drawbacks. Property has frequently to be left during the winter and is not safe from roving hunters. Stores are rifled, houses occupied and often defiled, and boats stolen. We have already described the case of Advent City. The wanton damage was such as might have been done by a German army in a French or Belgian village save that the settlement had not finally been set on fire. Somewhat less savage treatment has befallen the house at Cape Thordsen built by the Swedes in 1872, and that at Horn Sound built by Russians in 1900. Even in summer prospectors have been robbed of their stores when absent from camp for a day or two. The culprits are invariably Norwegians—not that Norway is in any sense responsible. Every country produces unprincipled men of that type, but Spitsbergen knows only those of Norwegian nationality. His country has no particular reason to be proud of him, and to do him justice he robs his countrymen and foreigners with a strict impartiality. As long as Spitsbergen is under no control, and has no police, this sort of thing will continue. To catch the culprit is no

easy matter ; to bring him to justice is a difficult task.

Under conditions such as these, development of mining properties is not facilitated. Security of title deeds and protection of property are essential if the necessary capital is to be attracted to Spitsbergen. Even if things work out fairly well in practice the capitalist who does not know Spitsbergen personally will be loth to invest his money in a no-man's land, beyond the protection of law. But this difficulty will soon be overcome.

There are, on the other hand, many factors which favour mining operations in Spitsbergen. Most minerals are within a few hundred yards of deep-water anchorage and so can be loaded easily and cheaply by wire-ropeways or other mechanical appliances without incurring the cost of land transit. The coal-beds are nearly all more or less horizontal, and so can be reached by tunnels into the hillside : expensive shafts are not required. The uniform low temperatures ensure that there will be no overheating in the mine, and prevent flooding, and so avoid pumping. Frost helps to maintain a firm roof and reduces the number of pit-props required. Gas is almost unknown. Mining can be continued all the year round, for the winter darkness is of course immaterial in the mine. Land for building is abundant and cheap, one might say free, and there is no lack of good building stone for jetties and wharves. Food and timber of course have to be imported, but they make northward cargoes for the vessels going to fetch minerals. The temperature of winter solves

cheaply the problem of cold storage. Until the present time there have been no taxes, mining dues, or royalties of any kind to pay, and, although this state of blissful freedom cannot continue, payments will be light and amply recompensed by the benefits received in return.

Normally the shipping season is from the middle of June until the middle of October. Some years it begins later: on the other hand, it could generally be extended in autumn by a month if a few lighthouses were erected. With the help of ice-breakers several bays could be reached much earlier in the season. The Foreland and King's Bay might with this means be reached as late as Christmas.

But if the season for export is short it must not be forgotten that the continuous daylight in summer saves a great deal of time and allows a vessel to load as soon as it arrives whatever time of day or night that may be. It is merely a question of having double shifts of labour, for no man however exacting can object to night-work when day and night are practically indistinguishable.

No difficulty has been experienced in finding a market for Spitsbergen minerals which up to the present have been mined.

Norway produces no coal: Sweden very little, of indifferent quality. Finland and Arctic Russia have none. All these countries have to depend on wood or imported coal for fuel. Before the war their demands for coal were met largely by Great Britain and to some extent by Germany. Northern Russia received some coal by rail from the south of the

country. In 1914 Norway's total import of coal was 2,764,204 tons, of which about 350,000 tons went to northern ports between Narvik and Vardö: in the same year Sweden imported 4,616,923 tons. The demands at Arkhangel and Murmansk, the terminal port of the new Murman Railway, are considerable and will greatly increase. During the war Norway literally starved for coal, and Sweden was short. We have seen how this demand stimulated Scandinavian interest in the Spitsbergen coalfields.

It is not only the northern ports which are easily supplied from Spitsbergen for local and bunker purposes. Three important railway lines lead to regions where the demand is great. The Lapland railway from Narvik to the Gällivare ironfields and the Baltic timber ports; the Murman railway to Karelia and White Sea ports; and the Arkhangel railway to agricultural Russia. Before many years there may also be a new railway from Pechenga or some port on Varangerfjord into Finland.

In the ports of northern Norway in pre-war days Spitsbergen coal used to be preferred to English coal, even if the latter was a little cheaper, as was sometimes the case. Tourist boats were always eager to coal in Advent Bay when the Arctic Coal Company could supply them. Steamers which filled their bunkers spread good reports of the coal's burning quality and its freedom from stone and ash.

Export on a commercial scale began about 1908, and for some years was very fitful. It was never equal to the demand in Norway, even in days of peace. The Nordenfjeldske Shipping Company

in 1910 offered to take fifty thousand tons a year if the Arctic Coal Company could supply that amount. Two years before the Norwegian railways had tried to contract with the Sheffield company for four thousand tons a year to be delivered at Narvik and two thousand tons a year at Trondhjem. The Arctic Coal Company in its best years used to send thirty to forty thousand tons a year to Tromsö, Narvik, and Trondhjem. Its Norwegian successors have only in the last year or two succeeded in equalling that amount but are sanguine of the future. And quite rightly so, for the coal is there and easy to mine. It is only a question of labour and tonnage to get it to port.

So far Norway has had most of the output. Swedish railways have placed contracts with the Swedish companies but have not succeeded in getting delivery. The Swedes in 1918 reported breaking out forty thousand tons, but for reasons arising out of the war most of this went to Norway. The demands of Murmansk and Arkhangel will not be met until Scandinavia's own population is supplied with fuel.

It is not an easy matter to arrive at reliable figures for the export of Spitsbergen coal since every company tends to exaggerate its output. For some years official figures of the import of Spitsbergen coal into Norway and Sweden have been published, but these of course do not include the considerable quantity supplied as bunker coal at the mines. Taking all considerations into account the following estimates of the output of coal in Spitsbergen are probably approximately accurate : 1909, fifteen thousand tons ;

1910, twenty thousand tons; 1911, twenty-five thousand tons; 1912, forty thousand tons; 1913, thirty-five thousand tons; 1914, forty thousand tons; 1915, twenty-eight thousand tons; 1916, twenty thousand tons; 1917, forty thousand tons; 1918, sixty thousand tons. In 1919 there may be an output of over eighty thousand tons, but much depends on labour conditions and the price of British coal in Scandinavia.

As regards the other minerals there is little need to point out the probable markets. Iron-ore, if of the high grade its owners hope, will be welcomed in this country. The difference in length of journey from Spitsbergen and from Narvik, where the Swedish ore is shipped, will have no adverse effect on the demand. During the war it was proposed to investigate and possibly make use of it, but circumstances were unfavourable.

The oil which Spitsbergen promises to yield will find a ready market. Except for some in the British Isles there is none in north-western Europe and the demand for oil is growing. By pipe-lines it can easily be led to convenient loading-places. In any case it promises to be a great deal more accessible to steamers than the Baku or Persian oil, or for that matter the Rumanian.

The marble has been brought in sample cargoes to this country and been well received. It may quite likely have a future before it.

Gypsum in the form of plaster of Paris is much used in building, more so on the continent than in the British Isles. In 1913 Norway imported about

four thousand five hundred tons and Sweden about twenty-three thousand tons—to take the two countries nearest to Spitsbergen, which produce no gypsum themselves. Since the prohibition of timber buildings in the larger Norwegian towns, on account of the risk of fire, the demand for gypsum is growing. The reconstruction of Belgium and the destroyed cities of France will add so greatly to the demand for plaster of Paris that the quarries of Paris and Nottinghamshire will be quite unable to meet it. The only other European supply is in Germany.

The following table gives the approximate distances in nautical miles from various ports to Spitsbergen :—

Aberdeen to Icefjord	1300
London to Icefjord	1750
Bergen to Icefjord	1150
Tromsö to Icefjord	520
Tromsö to Bell Sound	490
Norway to South Cape	370
Pechenga to Icefjord	640
Murmansk to Icefjord	650

The mileage divided by ten will give the approximate number of hours that a cargo boat would require for the journey: fast passenger boats would take considerably less time.

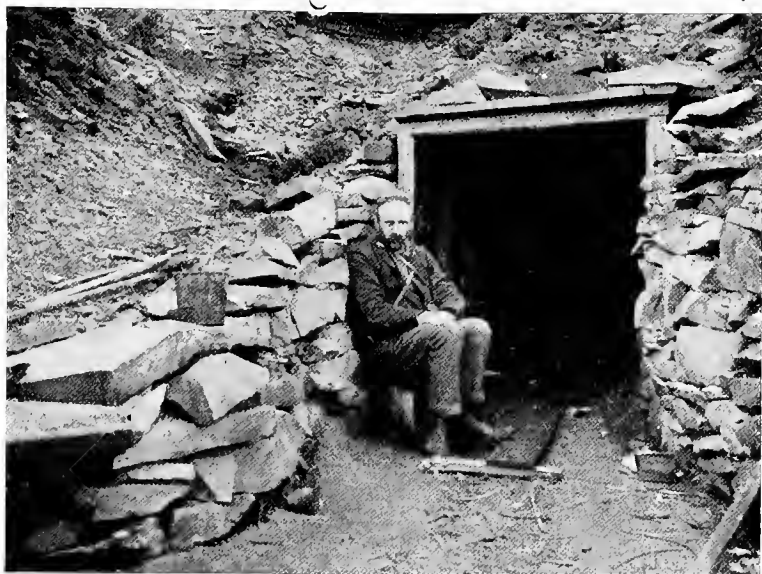
XXIII

THE MINING ESTATES

AT the risk of a certain amount of repetition of statements already made, it may be well to put on record the position and extent of the chief mining estates as they were in the spring of 1919. Only those estates of which the titles are believed to be valid will be described. It is more than probable that the summer of 1919 will see new estates added to the list: the boundaries of others will be extended and some may change hands or be abandoned.

To take British companies first, since they have the largest holdings in Spitsbergen, there are the estates of the Scottish Spitsbergen Syndicate and of the Northern Exploration Company.

The Scottish Spitsbergen Syndicate's estates embrace the whole of Prince Charles Foreland; the peninsula between Klaas Billen and Temple Bays to lat. $78^{\circ} 44'$ N., and long. 18° E.; the region between Temple Bay and Storfjord reaching on the north to lat. $78^{\circ} 25'$ N. and Wiche Bay, on the south to lat. $77^{\circ} 55'$ N., and on the west to the Sassen River and long. 18° E., and Barents Island. The total area of these estates is about 1650 square miles.



MINE OPENING IN GREEN HARBOUR.
Most of the coal mines are horizontal adits.



TOURISTS LANDING.
A party of Germans disembarking from a Hamburg-Amerika Liner.

The minerals on the estates of the Scottish company include practically all the enormous deposits of gypsum in the country. They are easily accessible and lie near good harbours. The estates also contain vast fields of Carboniferous coal, smaller areas of Tertiary coal, some magnetic iron-ore, oil-shale, and possibly free oil. Expeditions have surveyed and prospected the holdings in different years. In 1919 the company was reconstructed with a much increased capital, and sent a large expedition to Spitsbergen.

The estates of the Northern Exploration Company are practically all on the west coast, on the bays to the north and south of Icefjord but not on Icefjord itself. They comprise Horn Sound and its immediate hinterland as far north as and including the Dun Islands; the whole of the Bell Sound, Lowe Sound, and Van Keulen Bay region, with the exception of a Swedish area at the head of Michel Rinders Bay and Braganza Bay; the land between Safe Haven, St. John's Bay, and Foreland Sound; the whole of the English Bay, King's Bay, and Cross Bay area from about lat. $78^{\circ} 50' N.$ to lat. $79^{\circ} 20' N.$; Magdalena Bay, and surroundings; and the Thousand Islands south of Edge Island. The total area of these estates is 1800 square miles.

The Northern Exploration Company has valuable estates on which both Carboniferous and Tertiary coal occur. They also have magnetic iron-ore, asbestos, and indications of various other metallic ores. The coal seams in Lowe Sound are now being

worked after having been prospected and opened up for several years. Preparations are being made to develop the iron-ore resources in Recherche Bay. For several years marble was quarried in King's Bay, where a small settlement was built at Port Pierson on Bloomstrand Peninsula. The coal in King's Bay is being worked, as explained elsewhere, by a Norwegian company whose rights are contested. In 1918 the Northern Exploration Company was reorganized, and sent a wintering expedition to Lowe Sound. This year a large expedition has been in Spitsbergen.

Next in importance are Norwegian estates. They have recently been consolidated, with few exceptions, by the Store Norske Spitsbergen Kulkompagni, which in 1916 was formed to purchase the estates of the Arctic Coal Company of Boston, U.S.A.

The principal estate of the Store Norske Company lies in Icefjord, extending from Green Harbour to Advent Bay: on the south-west it meets the estates of the Northern Exploration Company. The ground along the coast between Coles Bay and Green Harbour is claimed by a Russian company which will be mentioned later. The Norske Kulfälter have the abandoned estates of the Sheffield company on the north-east side of Advent Bay: they are said to extend to the Sassen River. The A/S Kulspids owns the land between St. John's Bay, the mouth of English Bay, and Foreland Sound. In Bear Island the Björnøen Kulkompagni owns all the north-west, being the only company on the island. The total area

of all these Norwegian claims is about one thousand square miles.

Of the legitimate Norwegian companies the Store Norske is the only one which has devoted serious work to its estates. Its mine and camp at Longyear City have already been described. The great demand for coal in Norway, and its high price, have stimulated this company to increased effort, and steps have been taken to produce a large output. There seems to be no reason why the high hopes of this company should not be fulfilled. As an answer to those critics who say that Spitsbergen mining will never pay it may be mentioned that this company paid its preference dividend and ten per cent on its ordinary shares in 1917.

The Norske Kulfälter started with high hopes. Their plan was to tap the coal in a Tertiary outlier above the indifferent Jurassic coal which had ruined the Sheffield company. Tramway tracks and other material were even purchased, but little was done on the ground, and the prospects are not bright. The Björnøen Kulkompagni has made valiant attempts on its unpromising estates : these have been referred to in a previous chapter.

As a matter of historical interest certain other Norwegian companies may be mentioned, but they are of little practical importance. The A/S Svalbard claims estates in the interior between Adventdal and Lowe Sound : they lie at some distance from the coast and appear to clash with the estates of the Northern Exploration Company. The A/S Isefjord is a small company claiming land around Cape

Boheman, on the north side of Icefjord. The site has been a happy hunting ground for prospectors and claim stakers : at one time the Arctic Coal Company owned it but soon gave it up. The King's Bay Coal Company is mentioned elsewhere. The Green Harbour Coal Company is now absorbed in the Store Norske Spitsbergen Kulkompagni.

Swedish estates are not very extensive. The most important lies at the head of Lowe Sound surrounding Michel Rinders and Braganza Bays. On three sides it is surrounded by the estates of the Northern Exploration Company, while on the fourth side, the east, it has recently been extended up to the boundary of the Scottish Spitsbergen Syndicate's estates, and reaches Storfjord in the region of Cape Murchison, south of the Scottish boundary, in lat. $77^{\circ} 55' N$. A second Swedish estate lies around Mimers Bay, on the north-west of Klaas Billen Bay ; a third estate is at Cape Erdman, near the mouth of Icefjord ; and a fourth, now abandoned, was on the north-east side of Advent Bay, which the Norske Kulfälter now hold. All these estates, which have a total area of about 350 square miles, are owned by the Svenska Spetsbergens Kolfälter, which in 1916 acquired them from the Isefjorden-Belsund A/B, a company formed in 1911 to take over land claimed in 1910 by the expedition sent by the Svenska Jernkontoret (Swedish Iron and Steel Institute). This company is closely connected by an interchange of capital with the Northern Exploration Company.

Another small Swedish company is the Svenska

Spetsbergen Konsortiet, which in 1917 made a claim to a small estate at the head of Klaas Billen Bay. Most of the claim is valid, but a part that encroaches on the Scottish Spitsbergen Syndicate's estates will have to be abandoned. A third Swedish company is the Superfosfatfabrik A/B, which in 1918 took estates west of Northfjord, a branch of Icefjord and in the Dickson Bay region. This suggests a revival of the ill-fated venture of the Swedes in 1872. The total area of Swedish estates probably does not exceed 800 square miles.

Of the Swedish companies' operations there is little to add to what has already been said in relation to the mining settlements of Spitsbergen. Like the Norwegian companies their estates are held entirely for coal with the exception of the Superfosfatfabrik A/B, whose outlook, in the light of our existing knowledge of phosphates in Spitsbergen, cannot be considered good. Swedish effort so far has been concentrated on the Tertiary coal in Braganza Bay. There the same seam is being mined which the Northern Exploration Company is working further west. The great difficulty to overcome is the problem of export, for Braganza Bay is land-locked and more liable to be blocked by ice than any other bay on the west coast. To meet this difficulty it has been proposed to build a railway to the entrance of Bell Sound across the estates of the Northern Exploration Company. The project is feasible, but the cost of land transit would add considerably to the price of the coal.

A little work has been done on a seam of Carboni-

ferous coal on the Mimers Bay estate, and a small cargo of coal was even sent to Stockholm some years ago, but otherwise the Swedish export is entirely from Braganza Bay. Nothing has been done on the Erdman estate. The other Swedish companies have only roughly prospected their land.

Of Russian companies there are only two, and their present position and status is a little difficult to unravel. The Russian Spitsbergen Coal Company claims a strip of coal-bearing land along the shores of Icefjord between Green Harbour and Coles Bay. The Store Norske Company, as successors to the Arctic Coal Company, disputes the titles, but the Russians maintain that having secured the estate by purchase from earlier Norwegian owners they have a valid claim. The company originated in 1912 on the part of certain Russian naval officers who visited Spitsbergen on their way to Novaya Zemlya, with the object of acquiring mining estates either by annexation or purchase. During the war the property has been let to a private engineer in return for any developments made in the estate. In 1918 the Russian owners tried to sell the land, but their price was excessive and no purchaser was found. The Grumant Company of Arkhangel and Petrograd have a small estate in Coles Bay, said to have been purchased from the Americans some years ago. This or another company claims the peninsula west of Green Harbour in which Linné or Russian Valley lies. The total area of these Russian claims is not more than one hundred square miles.

In 1917 the lessee of the Russian Spitsbergen



WIRELESS STATION IN GREEN HARBOUR.

This station, erected in 1911, belongs to the Norwegian Government. It is open throughout the year, and transmits a daily weather report.

Coal Company did a good deal of opening up seams, and even constructed a rough jetty, so that in 1918 a fairly considerable export was possible. In the case of the other small companies mentioned little or no development work has yet been done.

XXIV

RECENT SCANDINAVIAN ENTERPRISE

A PART from hunting enterprises, which have already been described, Norwegian interest in Spitsbergen did not show itself until recent times. Before the twentieth century there was scarcely a Norwegian expedition, if we except the researches of Keilhau in 1827 and the voyages of enterprising hunters, such as Elling Carlsen, Rönnbäk, and Andreason. These were all individual efforts and received no support from the State or from scientific bodies in Norway. Despite her proximity to Spitsbergen and her maritime ascendancy Norway was little concerned with the country until others drew attention to it. Then she developed suddenly a great interest in Spitsbergen and showed anxiety to gain a firm foothold in it. The attempts of Norwegians to exploit the coal measures during the early years of this century are noticed in another chapter. They came to nothing, and before long the estates passed into more enterprising hands.

At the outbreak of the European War there was no Norwegian estate in Spitsbergen of any real value and few with valid titles. The purchase of the valuable American coal-mines in 1916 was of course a legitimate stroke of business, but Norwegians were

busy during the war in pirating minerals and laying specious claims to British estates. It naturally caused much ill-feeling among British owners that while their country was engaged in defending the cause of civilization a neutral country, ultimately to profit by the Allies' sacrifices, was filching British property. Under war conditions it was impossible for British companies to continue operations in the far north. Ships, materials, labour, and food were all unobtainable. Many mushroom Norwegian companies appeared, others more or less moribund were revived, and individual trespassers, with no capital and much cupidity, were busy. A company, calling itself A/S Kulspids, which had previously tried to jump British claims in Recherche Bay, contrived to mine some asbestos near the place in 1917 and 1918 until warned off by the owners. Another company, called A/S Svalbard, is trying to contest undeniable British claims between Advent Bay and Lowe Sound, where there is good coal but no facilities for shipping owing to distance from the sea.

In King's Bay certain Norwegians from Aalesund claimed coal-bearing land in 1909, which for four years had belonged to a British company and had not been surrendered. Ignoring the absent British owners, these Norwegians, now styled the King's Bay Coal Company, started work in 1917. They sunk a great deal of capital and worked in feverish haste to extract coal. The first winter they dug over ten thousand tons, and were busy shipping it to Norway in the summer. Challenged by the British owners these Norwegians did not deny that they had no claim to the land, but

merely pleaded that the war had made a demand for coal and had given them the opportunity to take it. Their aim was to mine as much coal as possible while the demand lasted and before they were turned out. Their work has certainly helped to develop a British estate. At the same time free use was made of the temporarily deserted settlement at the British marble quarries across the bay. Other Norwegians have been casting covetous eyes on Prince Charles Foreland, and staking out spurious claims where they have no vestige of right.

A few years ago a Norwegian company was floated to dig guano at Middle Hook in Bell Sound. The land has been British for many years, and the company knew this perfectly well. The attempt was abandoned, probably owing to failure to raise capital for such a wild-cat scheme rather than in response to the British protest. These are some of the principal instances of claim-jumping; but there are others, some of which are of no importance either because the claimants fail to return or because the mineral they seek does not occur there. Norwegians have not been alone in this kind of work. There are instances of Swedish trespass on British claims in Klaas Billen, Sassen, and Agardh Bays, where a British company took an estate years before the Swedish prospectors were on the scene.

Of course acts of this nature are the work of individuals, including members of the Norwegian survey expeditions. The Norwegian State cannot be responsible for the actions of Norwegian subjects outside its territorial jurisdiction. In no-man's land

Norwegian authority has no more validity than Chinese. At the same time the Norwegian Government must have been aware of what was going on in Spitsbergen. It could certainly have prohibited Norwegian officers violating British claims and it could have warned its subjects not to trespass on acknowledged British territory. Such a warning would have had no binding force behind it, but it would have been at least an act of friendliness and goodwill towards Britain.

Norwegian activity took other forms beside an interest in minerals. The survey work of the Norwegian Government has already been described. A venture in another direction was practically forced on Norway.

With the development of their coal-mine the Americans proposed to erect a wireless station at Longyear City of sufficiently high power to talk with Scotland, where they also hoped to erect a station. This plan, if carried through, would leave Norway on one side and might strengthen Great Britain's relations with Spitsbergen. Norway was not slow to act. The Storting voted fourteen thousand pounds for the erection of a State wireless station in Green Harbour, with another at Ingö, in the north of Norway. The Americans then decided to abandon their own project and proposed instead to put up a small station at Longyear City to speak with Green Harbour.

The Norwegian Government ordered the materials for the station from the German makers of the Telefunken system. The wooden buildings were made in

Norway and packed in sections for transport. Eight months was said to be the time required for erecting a station of that order, for this was before the days when war conditions had taught speed of work. In Spitsbergen it was calculated that not more than ten weeks' building season could be assured, on account of the possibility of snow and frost. Work was begun in Green Harbour on July 11, 1911, and in a little less than ten weeks the station was in working order. The number of workmen varied, but the maximum was forty-five, in addition to fitters and the station employees. The work went on day and night, and the men being all Norwegians took a pride in completing this national undertaking. The station at Ingö was temporarily completed on November 23, and on that night the first messages were exchanged with Spitsbergen. Two weeks later the service was opened to the public and has remained open ever since, both summer and winter. During the first half-year the receipts were given as four hundred pounds and in the following complete year one thousand pounds. The station is of service to the mining companies and is much used by tourists. It transmits a daily weather report to the Meteorological Office in London. While messages normally are transmitted via Ingö to the Norwegian telegraph system, the station is powerful enough to speak Christiania and Berlin direct. In still winter weather it can speak Poldhu, in Cornwall, and it normally picks up the noon time-signal from the Eiffel Tower in Paris. It is of interest to note that the site of the wireless station is the only land in Spits-

bergen which belongs to any State as opposed to private owners.

The erection of a State-owned wireless station in Green Harbour was quickly followed by the institution of a post-office and mail service. On the house of the superintendent of the wireless station is fixed one of the small red letter-boxes so familiar in Norway. Letters can be posted there to any part of the world at Norwegian postal rates and bearing Norwegian postage stamps: the postmark is "Green Harbour." Mails to Spitsbergen, which do not figure in the *Post-Office Guide*, are addressed "via Tromsö." In 1912 a small motor sloop was subsidized by the Norwegian Government to make some six journeys a summer between Tromsö and Green Harbour, carrying the mails. The mail-bags as a rule are not heavy, and are mainly for the staff of the wireless station. Needless to say there is no delivery of letters beyond Green Harbour. Some letters lie all through the summer waiting claimants. Every caller at the post office looks through the small collection to try to identify some of the addresses. The outward mail is generally heavier, containing as it does many picture post cards sent by tourists. During the first year of its existence this post office handled about 3700 postal packets. The number was small if one remembers that the staff of the station and the whaling station, which then adjoined, accounted for some forty men, and that several hundred tourists had probably landed during the summer. The truth is that very few of the inhabitants make any use of this post office. The mining companies carry their

own mails in their store-ships and colliers quicker and more regularly than the Norwegian post-boat. The motor-sloop is said now to have been replaced by a small steamer, but the service is obviously maintained merely to strengthen the Norwegian position in Spitsbergen.

A proposal was made in Norway some years ago to build a church in Spitsbergen. This would be probably erected in Advent Bay. A papal decree of June 1, 1913, shows that the Roman Catholic Church was also contemplating the extension of its sphere of influence to the Arctic regions. It was decided that "in order that the spiritual needs of the Catholics visiting or settled there may be in some degree cared for, and in order that the Gospel may also be preached in all these remote districts . . . the group of islands called Spitsbergen shall be combined with the apostolic vicariate of Norway, so as to form an integral part of one vicariate, which shall now be called the Vicariate of Norway and Spitsbergen." This proposal was approved by the Pope in June, 1913.

This account of Scandinavian enterprise would be incomplete without a reference to whaling. Modern whaling in Spitsbergen waters was begun by Norwegians at the opening of the present century. They were the first to make use of the bays for this industry since the Dutch and English deserted them over two centuries before. Scottish whalers, it is true, had hunted the Greenland whale in the seas between Spitsbergen and Greenland for over a century before the Norwegian whalers appeared in the north, but

they used to carry their blubber home and had no shore cookers in Spitsbergen. The Norwegians came to hunt the finner whale. The invention of the explosive harpoon in 1868 by Sven Foyn had made possible the pursuit of this quick-moving whale. The result was the evolution of the modern whaler, an ugly iron vessel of 100–115 feet in length, with a speed of 11–12 knots. Mr. W. G. Burn-Murdoch has described the whaling of to-day in his fascinating volume on *Modern Whaling and Bear Hunting*: its pages are full of information, and glow with the colour of Arctic seas. Here we need only trace the effect of whaling on Spitsbergen.

The origin of its revival in the north is interesting. For many years finners had been hunted on the coasts of Norway, but gradually this evoked opposition from the cod-fishers. They argued that the whales feed on *capelan*, a kind of salmon, which drives the cod inshore, within reach of the fishing boats: the destruction of the whales freed the *capelan* from their enemy, and so the cod no longer frequented the coastal waters. The Norwegian Government, after investigation, decided there was no truth in this theory, and refused to protect the whales; but the fishermen were convinced that the whalers were their enemies. Their conviction found expression in the attack on a whaling station near the North Cape, and then the Norwegian Government, after the manner of governments, convinced by this act of violence, took action. Whaling was forbidden from 1904 onwards in the waters of northern Norway. A few years before the industry had once more reached

Spitsbergen: this drastic prohibition in Norway gave it a great stimulus, eight companies migrating to Spitsbergen and one to Bear Island in 1905.

Floating factories were sent up to Horn Sound, Bell Sound, Safe Harbour, and Hecla Harbour, on the west side of Green Harbour. Land factories were built at South Haven, in Bear Island, and at Finnes Haven, in Green Harbour, where the wireless station now stands. Great success attended the first year's efforts, but the factory in Bell Sound proved somewhat inaccessible on account of ice in the early part of the summer, and several vessels which entered with difficulty were frozen in: so it was moved north to Icefjord. The first year's results were not maintained, and one by one the companies abandoned Spitsbergen in favour of richer seas, several going to the South Atlantic. Difficult ice conditions in some years were partly to blame, but the decrease in number of whales caught was steady. Bear Island was abandoned in 1908: it was never a good station, on account of the bad harbour accommodation and the frequency of ice and mist in early summer. From 1909 to 1912 only two companies remained in Spitsbergen, both working from Green Harbour, but often towing their whales temporarily into other harbours and anchoring them there when the hunting was good. The poor catch in 1912 gave the final blow to the industry: to minimize the loss that year old discarded carcasses and bones lying about the beach were dug up and utilized in the factory for oil and bone manure.

White-whaling, which is carried on in a totally

different and more primitive way from small sloops, continued in a desultory fashion, but has now been practically given up.

The following table, compiled by Major Isachsen, gives some idea of the decline of the finner whaling in Spitsbergen and Bear Island waters.

Year	No. of Companies	No. of Whalers	Whalea caught	Barrels of Oil
1905 . .	8	16	599	1166
1906 . .	7	14	315	785
1907 . .	7	15	333	628
1908 . .	5	11	270	—
1909 . .	2	6	114	717
1910 . .	2	6	165	900
1911 . .	2	6	144	936
1912 . .	2	6	55	366

XXV

GERMAN SCHEMES

A FEW German exploring expeditions have already been noted. But Germany was never pre-eminent in her polar explorers. North and south polar regions have witnessed several attempts, nearly all of which have been little more than failures. The Teutonic mind lacks the elasticity and power of quick adaptation which are essential to polar exploration. One German expedition has been omitted in the previous pages, not because it was too small to deserve notice but because it added nothing to our knowledge of Spitsbergen. The expedition of Lieutenant Schroeder-Stranz is conspicuous as having been the most tragic story of any in the annals of Spitsbergen.

The *Herzog Ernst* was lying in Tromsø in July, 1912. She was a well-found ship, strongly built of timber, and adequately equipped in nearly all respects. There was a staff of some six to eight young university men, well instructed in their respective branches of science and drilled in true Prussian fashion to a blind respect for their leader and obedience to his commands. Tromsø was much amused at the military salutes Lieutenant Stranz expected and received from his staff. The equipment, as I have said, was

nearly perfect. Certainly it lacked nothing in respect of clothing. These would-be explorers went about Tromsö in midsummer in clothes fit for an Antarctic winter, and were blandly unconscious of the smiles they evoked.

On board the ship there was an abundance of scientific instruments, volumes on science, collecting apparatus, and so forth. All the greater, therefore, was the amazement of Dr. Bruce and myself—we were in Tromsö at the time—to be told by Lieutenant Stranz that he had practically no charts of Spitsbergen on board except Filchner's elaborate maps of the Post Glacier, which could not possibly be of any service to him. We supplied him with what charts we had, and Bruce gave him much information, which he was ready enough to seek. Then we left them and set out ourselves for the north—in a very humble sloop and lacking all the outward semblance of polar explorers. A day later, after many speeches, which we had escaped by putting to sea, the *Herzog Ernst* sailed for Spitsbergen. The objects of the expedition were not clear. It was held by some of its members that it was for the purpose of gaining experience for a larger expedition the following year, which was to attempt the north-east passage. Lieutenant Stranz was anxious to winter, but he kept his ambition secret from his officers and men, who all believed they would return to civilization in autumn.

The *Herzog Ernst* reached the North Cape of Spitsbergen on August 12, when Lieutenant Stranz, with three companions, left on a sledge journey to explore

the coast of North-East Land. They intended to return to Treurenberg Bay, where the ship was to precede them, by crossing the inland ice and Hinlopen Strait, thus following to some extent the footsteps of Baron Nordenskjöld. Lieutenant Stranz and his three companions were never heard of again. There is little doubt that they fell through the ice in Hinlopen Strait. Experienced polar travellers would not have attempted the journey in August, but not a man on the *Herzog Ernst* except the pilot had ever seen polar ice before. Early in September the ship was frozen fast in Treurenberg Bay. Of the twelve men on board nine became panic-struck at the prospect of a winter on the ice, despite the safe anchorage, abandoned the ship on September 21, and attempted to retreat across country to Advent Bay, in the hope of reaching Longyear City before the last vessel of the season had left for Norway. Three Norwegian members of the crew remained on the ship. The route to Advent Bay, via Wijde Bay, which the retreating men followed is not difficult. Men in good condition could do the journey in about seven days, without any danger and with little hardship. But cold feet are a bad impediment for a polar journey : these Germans had no self-confidence and little trust in their leader, Captain Ritscher. In Wijde Bay, two of the scientists, pushing on ahead, were lost. A few days later Dr. Rüdiger was frostbitten and dropped out with one companion, named Rave. The two stayed in a hut they found in Wijde Bay for several days, and ultimately managed to regain the ship. The captain, with one other German and two

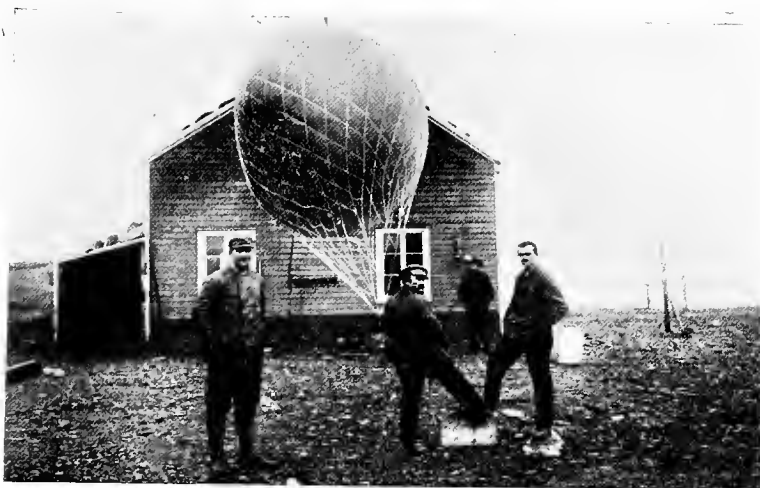
Norwegians, pushed on, and soon found himself alone, the two Norwegians returning to the ship and the German contriving to lose himself. At last, on December 27, Captain Ritscher, badly frostbitten, arrived at Longyear City.

Without delay the Americans sent out a relief expedition of Norwegian miners to look for the missing men, but it was unsuccessful, largely because Longyear City had not the equipment required for the task. The news of the disaster was sent out by wireless from Green Harbour, and picked up by the Germans at the observatory in Cross Bay. Assisted by the British in the King's Bay marble quarries, they sent a search expedition across country, in March, to Wijde Bay and Wood Bay. Dr. Wegener and Mr. Miller made a splendid march, but had no more success than the Americans. Meanwhile two expeditions were on their way from Europe. Captain Staxrud, an experienced Spitsbergen traveller, reached Advent Bay early in April in the *Hertha*. Travelling by Klaas Billen Bay and Wijde Bay, and then across country, he quickly reached Treurenberg Bay, to find only Rüdiger and Rave on board the *Herzog Ernst*. They had refused to attempt the overland journey a second time when the Norwegian crew left the ship for Advent Bay in the end of March. Under Captain Staxrud's guidance, however, they successfully accomplished the journey.

The second relief expedition sailed from Norway in the whaler *Lövenskjöld*, under the leadership of Th. Lerner, a ubiquitous German of whom we shall have more to say. On reaching Treurenberg Bay

Lerner, finding that his compatriots had already been rescued, made for North-East Land, where he sledged along the coast from North Cape to Hinlopen Strait, and along the strait, looking for traces of Lieutenant Schroeder-Stranz. In this he failed, and he managed to lose his ship, but reached Treurenberg Bay on foot. There he found Captain Staxrud, who had returned from Advent Bay with several men to salve the *Herzog Ernst*. Eventually this ill-fated ship reached Icefjord none the worse for her neglect, but eight out of the original fifteen members of the expedition had lost their lives, and two of the survivors were partly crippled through amputation following frostbite. Christopher Rave was the only German who survived uninjured. Thus ended the most ambitious expedition that Germany ever sent to Arctic regions. The materials were good, the machine was perfect, but the men were lacking. They feared their leader, but had little faith in him: once he had gone, the bond of discipline which held them snapped, and all was chaos. Captain Ritscher was clearly unable to hold the expedition together, and dissension wrought havoc. The military discipline system on which this expedition was based is not only valueless but actually detrimental to such an enterprise. Successful polar exploration is largely dependent on personal initiative, on the courage to break orders, as well as the ability to obey them, and on the power to lead as well as frank and loyal recognition of leadership.

Before this time German activity had been taking other forms in Spitsbergen. For several years



GERMAN WIRELESS STATION, AUGUST, 1914.

The staff is preparing to send up the balloon to which the aerial is attached.



A CLAIM BOARD.

Notice boards indicate the boundaries of mining estates.

Th. Lerner, who was a German journalist associated with a Berlin newspaper, had haunted Spitsbergen. No one exactly knew what he was doing or where he obtained his ample funds, but he had certainly caught the fascination of the Arctic. He came to see Andrée start on his balloon voyage in 1897, and for the next ten summers he was frequently in Spitsbergen. One year he wintered, in company with Lieutenant Hjalmar Johansen, who had been Nansen's sole companion on his famous transpolar journey. Lerner's last appearance in Spitsbergen was in 1914, in the month when war broke out. He was always eager for sensational news, and on one occasion, on the flimsiest pretext, hurried south to Tromsø, to report that Dr. W. S. Bruce and his companions had died of starvation on Prince Charles Foreland. The lie was a poor one, and met with little credence.

It was, however, on Bear Island that Lerner achieved notoriety in a little comic opera of his own setting. In 1898 he made a preliminary visit to that island, and marked off certain landing-places in South Haven and Walrus Haven, which give access to coal-bearing rocks, as his private property. Boulders on the beach were also luridly painted with the German colours. The same summer another German expedition, sent by the Deutsche Seefischerei-Verein to investigate fisheries, set up a few small huts on the ground claimed by Lerner, who was not consulted in the matter. Next summer was more eventful. Lerner, travelling in a fast steamer, was landed on Bear Island before the end of May. The vessel

returned south, to bring a German mining engineer and several miners. No time was lost by Lerner in extending and consolidating his claims. Small huts were built at the corners of the estates, and boards, warning trespassers off his private property, were erected at every landing-place.

Then Lerner's rivals appeared. This was an expedition sent by the Deutsche Seefischerei-Verein to continue the investigations begun the previous year. It had left Hamburg before Lerner but had dallied on the way. Two trawlers accompanied the expedition. Lerner was expecting it, and thwarted all its attempts to acquire land or make use of its huts. Eventually a small hut was built at a poor anchorage on the east coast, the only place where Lerner would tolerate his compatriots. The fishery expedition then left the island. After a profitless visit next year the project was abandoned.

Lerner's next visitors were a party of Swedish explorers, under Dr. J. G. Andersson. He received them with an armed guard at the landing-place, and after reading a long address on his rights to the island gave them permission to continue their work. Norwegian whalers, who for several years had maintained a station on South Haven, were received in a similar way, but they treated this buccaneer in a more cavalier fashion. There was the possibility of a more serious situation when the Russian cruiser *Svetlanda* appeared. Undoubtedly she had come to investigate the German activity on the island, for at that time Russia felt a traditional interest in Spitsbergen. Fortunately, the cruiser's commander was

not lacking in tact. Maintaining that his sole object was to raise the Russian flag over the ruined huts and graves of Russian trappers, he denied any desire to interfere with Lerner and the Baren Insel Gesellschaft, as the German company was named. The Russian flag was left flying over some ruins in North Bay. Lerner promised to take it under his protection, and the *Svetlanda* sailed for home. The Germans extracted a few tons of coal for the use of their own vessel, and returned to Hamburg in the autumn. That was the end of the only German mining enterprise in Spitsbergen. The estates have since been claimed by Norwegians.

Later German schemes to acquire land have not been successful. Offers to buy British estates were declined and schemes to get hold of American estates fell through. The report of oil-bearing rocks on the estate of a British company resulted in an unsuccessful German attempt to find them in 1913. It might be said that the desire of German subjects to acquire mineral-bearing lands in Spitsbergen was a natural commercial enterprise. British, Norwegian, Swedish, and Russian subjects did so, and why not German? Possibly these efforts were quite innocent: Germans were never blind to commercial advantages. At the same time, there is considerable evidence to show that Germany was fully aware of the strategic importance of Spitsbergen in relation to North Atlantic and Arctic trade routes. In this respect perhaps she stood alone. The presence of oil in the vicinity of excellent harbours not four hundred miles from the stream of shipping round the North Cape

to and from Arctic Russia would have been of service to the submarine campaign that in those days no doubt the German war lords were planning.

Another German action is more significant in the light of later events. Ostensibly with the aim of experimenting with dirigible balloons for a north polar voyage an expedition sailed for Cross Bay in 1910. This bay, which is a northern branch of King's Bay, is one of the most beautiful in Spitsbergen. To the east rises the high snow-covered plateau of King James Land, from the north two long glaciers reach the waters of the bay and on the west are rugged mountains, except where lowland gaps give easy access to the coast. It shares with King's Bay the merit of being one of the easiest bays to approach. In early summer, when the pack may block the southwest coast, there is every likelihood of vessels being able to pass west of the pack outside the Foreland to King's Bay. Even in many months of winter it is not improbable that ice conditions would allow vessels to enter. In common with other fjords it has deep water, but there are several good sheltered anchorages for large vessels: of these Port Signe and Port Müller are the best. The German expedition to this bay sailed in the luxurious liner, the *Mainz*, lent free of charge by the owners, the Norddeutscher-Lloyd Company. Count Zeppelin, who led the expedition, was accompanied by Prince Henry of Prussia, Count Zedlitz, and a large staff of scientific experts.

After careful examination of the valley abutting on the bay Count Zeppelin selected Port Signe, with

its low open valley leading to the wide Dieset Plain on the west coast, as an admirable site for an airship base. He thought Red Bay would also be a useful station. Spitsbergen in general impressed him as being favourable to aerial navigation. The range of temperature is small, and there is little precipitation. Fogs are frequent but generally low-lying, and calm weather is fairly common. The experiments carried out appeared to have met with great success. In furtherance of whatever schemes were in the German mind, a meteorological station was founded in Ebeltoft Harbour, and a small party left in charge during the winter. Since then the staff was relieved annually until 1914. The chief work of the observers was to take high level observations of air currents, temperature, and pressure. This was done by means of meteorological instruments attached to captive balloons, which under favourable weather conditions ascended to several thousand feet.

The station also served for the reception and transmission of wireless messages. Instead of the usual rigid masts to support the aerials, captive balloons were employed. This method restricted the use of the apparatus to relatively calm weather, but under these conditions—the best for wireless telegraphy—it facilitated the transmission and reception of long-range signals. There was nothing to prevent this station having direct communication with Germany: it could certainly speak Norway, although it generally made use of the intermediate station at Green Harbour. The relief party for the winter of 1914–15 was in the vicinity of Spitsbergen, on a large German

vessel cruising with tourists, when war broke out. A wireless message from Norway warned the vessel, which promptly turned back to Germany, leaving the Ebeltoft station to its fate. The observers at that time were only three in number, a military flying officer, a meteorologist, and a sailor who had previously had experience in Antarctic Seas. Their stores were insufficient to last them throughout the winter, and they were bitter with their compatriots for leaving them in the lurch. Dr. Bruce, who chanced to be in Spitsbergen during that fateful August, curious to see what these Germans were about, visited the station. The Germans' chief desire was to leave before the winter: they did not seem to anticipate being made prisoners. The Norwegian ship, on board which Dr. Bruce was at the time, was careful to maintain an attitude of neutrality, and did not offer the observers a passage to Europe. However, they got away in the following month, and succeeded in reaching Germany. Despite rumours to the contrary, the station was deserted from that date onwards.

Ebeltoft Harbour, and surrounding territory, had been claimed by the Germans: a notice to that effect used to stand in the vicinity of the station. In the neighbourhood a large tract of land was claimed, about the same date, by the Norddeutscher-Lloyd Company, with the object, it is said, of building a large tourist hotel. These estates, abandoned out of necessity in 1914, will never be German again. An expedition belonging to a British mining company, which for many years has owned the land on the

opposite side of Cross Bay, in the summer of 1918 annexed the whole peninsula on which the German estates were situated, and raised the British flag at Ebeltoft Haven. It was this action which, exaggerated in significance by the Press, gave rise at the time to the report that Britain had annexed Spitsbergen.

It is impossible to say with certainty that these German schemes in Cross Bay had any sinister purpose. They may have been innocent, scientific experiments. Perhaps the observatory was designed to further plans for a polar expedition in a dirigible balloon. On more than one occasion Professor Hugo Hegersell took similar observations, when he was the guest of the Prince of Monaco, in the *Princesse Alice*, in Spitsbergen waters. Possibly Professor Hegersell was not abusing the hospitality of his royal host: possibly, too, Count Zeppelin had quite disinterested motives. But the German preparations for war were so extensive, every detail was so carefully planned, and no possible ground of advantage neglected, that it is a little difficult to believe that someone in Germany had not his eye on Spitsbergen as a possible base for raiding airships. In any case, whatever may have been the German motives in the country, we must take no risks again. Aviation has made such strides in the years of war that Spitsbergen can now be regarded as a strategic air-base of great value. That is equivalent to saying that it is not a place to which Germans must be allowed free access.

That Germany had not lost her interest in Spits-

bergen during the war was evident in several ways, and not least by the publication by the German Admiralty of an elaborate handbook of Spitsbergen, with full sailing directions, views, and harbour plans.

XXVI

MODERN HISTORY

THE dispute over the sovereignty of Spitsbergen, which died down in the seventeenth century, was not revived for about two hundred years. When the Russian trappers monopolized the country none of the former claimants interfered. Neither Norway nor Denmark raised a voice in defence of their rights, and Britain had no protest to make. Russia put forward no claim for ownership to a country that Russians alone were exploiting. Throughout the eighteenth century only one event occurred that had any bearing on the question of sovereignty, and that was on the part of Russia. In 1764 the Empress Catherine II gave her sanction for an attempt to be made to find a sea route to the East via Spitsbergen. The same year Lieutenant Michael Nemtinoff led an expedition to Recherche Bay, which built several dwelling-houses, bath-houses, and store sheds, and left sixteen men to winter. This seems to have been the sole object of the expedition.

Various reasons have been given for the foundation of this settlement. It was certainly not for the purposes of exploration, and if it was intended as a base for future work there was no reason for leaving

a number of men in charge. It has been suggested that the purpose was to investigate the possibility of founding a Samoyede settlement in Spitsbergen, possibly as an indication of Russian ownership. Another explanation was that the settlement was in reality a military post. Whatever its purpose was the site selected was one long favoured by Russian trappers, to whom it was known as Klok Bay. The following year a larger Russian expedition of three ships, under Tschitschagof, visited Recherche Bay, and found all the winterers alive and well. The expedition sailed north, met pack-ice, and returned home without attempting any exploration. In 1766 Tschitschagof again sailed for Spitsbergen. He found eight of the winterers alive, the other eight having died of scurvy. With the survivors he sailed for home. That was the end of the Russian post in Recherche Bay: all trace of it has long since disappeared. If Russia meant at this date to establish a claim to Spitsbergen she failed to make her attitude clear. The establishment of the post in Recherche Bay may have been with this end in view: in that case its abandonment signified the withdrawal of the claim, as no other means of asserting it were employed.

It was a century later before the question was again raised. In 1871 the Swedish explorer, Baron A. E. Nordenskjöld, who was interested in a company formed to mine phosphatic rocks at Cape Thordsen, asked the Swedish Foreign Office to extend the protection of Norway-Sweden to Spitsbergen. Enquiries were addressed to the various Governments

of Europe which could possibly have any views on the question, in order to discover if there was any opposition to such action on the part of Norway-Sweden. Russia alone raised objections. On the ground that Spitsbergen had been known and inhabited by Russians long before its discovery by the Dutch, Russia preferred that it should remain, as it was, a *terra nullius*. Holland gave her consent to the protection of Norway-Sweden, provided no other Power objected. The Russian attitude, however, caused the proposal to be abandoned. Probably there was no truth in the Russian argument: if there was, Russia's attitude was a poor compromise, for apparently she neither wanted Spitsbergen herself nor wished any other State to possess it.

Events in 1899, however, showed that Russia had not forgotten her interests. That year a German company made a great show of annexing land in Bear Island. The annexation, which had begun the previous year, attracted some attention, and a Russian cruiser was sent to investigate the matter. The German Chancellor refused a request on behalf of the German company to annex the island, and it was semi-officially denied that Germany had any territorial ambitions there. This disavowal of the action of the Hamburg company made it safe for Russia to say that she had no intention of protesting against German annexation, but it is doubtful if Russia would ever agree to acquiesce in such a proceeding. Swedish opinion at the time was opposed to both Russian and German

mitted her proposals to the Powers. Her alternative plans were: (1) that an international judicial commission should be established; (2) that one of the Powers concerned should receive a mandate from the others to apply her own civil and criminal jurisdiction to Spitsbergen, and to use her own courts. It is difficult to discriminate between the second proposal and annexation by the Power concerned, except that administration under a mandate is open to revision and annexation is not. The first of these proposals was clearly unworkable and gained no support: the second, obviously designed in Norway's favour, met with considerable criticism, but was made the basis of further consideration.

The record of British claims was growing year by year in the Foreign Office, but the Government showed little inclination to protect her subjects and none at all to encourage their claims in the national interest. The Foreign Office exhibited its habitual indifference to the work and suggestions of British pioneers. A year or so previously the Foreign Office, through its spokesman in the House of Commons, had said that British subjects going to Spitsbergen did so at their own risk, and that Britain could accept no responsibility.

Meanwhile the United States was becoming interested in Spitsbergen, owing to valuable American mines. In its sitting of December 15, 1909, the Committee for Foreign Affairs of the United States Senate recommended the extension of American protection to ownerless islands where American

subjects had discovered coal or other minerals. The suggestion clearly concerned Spitsbergen, but it came to nothing as far as that land was concerned. It was no doubt prompted by fears expressed by the American miners that Norway aimed at acquiring Spitsbergen, or at least at applying Norwegian laws and levying mining dues. They wanted American, or, failing that, British protection.

Norway, Sweden, and Russia continued their attempts to settle Spitsbergen matters, but in an atmosphere of distrust they made little progress. Fortunately, the commercial development did not wait for the politicians, and went on apace. Representatives of the three Powers met at Christiania in 1910, when Russia abandoned her old attitude of obstruction, and so successfully smoothed the troubled waters that a scheme, agreeable to all, was adopted. When submitted to the other Powers it did not prove so acceptable, and was returned for amendments. In 1912 the delegates of the three Powers met again at Christiania and revived their proposals. This time they met with more approval, and it was decided to call together a conference, representing all the Powers, in the hope that the matter could be settled and a convention signed. Not till June, 1914, did this larger conference meet at Christiania, after a preliminary meeting of the Norwegian, Swedish, and Russian delegates, who revised their scheme in the light of the latest criticisms. At the larger conference the Powers represented were Norway, Sweden, Russia, Britain, France, Germany, Holland, Belgium, and the United States. The main terms of the

draft scheme submitted for consideration were as follows :—

Spitsbergen was to remain a *terra nullius*, neutralized and open, as hitherto, to the subjects of all nations.

It was to be administered by a commission of three members, of whom Norway, Sweden, and Russia were each to nominate one, and which was to sit in the country of its president.

An international police force was to be established, under a commissioner who was to be of the country which had the largest number of subjects in Spitsbergen.

Laws made by the commission were to become effective if approved by the majority of the signatory Powers.

The commission was to have the power to levy taxes, but provision was made for any deficit by contributions from the signatory Powers.

Serious crimes were to be submitted to trial in the national courts of the accused.

Civil cases were to be submitted to judgment and tried by the Swiss legal code, with appeal to an international tribunal.

Any disputes over claims made prior to the Convention coming into effect were to be submitted to a special tribunal.

Right of exploitation was not to include ownership of the soil.

Hunting was to be free to all.

Measures were to be taken to protect animal life from excessive hunting.

It was proposed to protect areas of special scientific interest.

These proposals differed slightly from earlier suggestions, though they had not quite so strong a Norwegian inclination. The seat of the commission, and other authority, was not necessarily to be in Tromsø, as Norway had hoped. The police commissioner might be British, Norwegian, or Swedish—the condition of appointment practically excluded other nationalities—but in actual practice he would almost certainly be Norwegian at first, as Norway originally suggested. Subsequently the condition of tenure of the post might necessitate a British official, for the continued employment of Norwegian labour by British companies is very doubtful. This clause might also promote difficulties if a large number of Finns were employed. In that case the police commissioner, who would in practice be the virtual governor, would be chosen by a nation unrepresented on the commission of government.

One other difficulty may be noted. The companies who claim estates are not likely to admit that they have merely the right of exploitation, and are excluded from ownership of the soil. Why should this distinction be made? The land when they took it belonged to no man: no one was expropriated by their claim. They will not be prepared to have their ownership transformed to a tenancy. Mr. Robert Lansing, who discussed this problem before he became United

States Foreign Secretary, and so spoke as a private person, said that land in Spitsbergen could not in a true sense be owned, as exclusive use and occupancy could not exist. But that exclusive use, including the banishment of hunters, is exactly the reason why mining companies, without exception, are in favour of some form of governmental control. Mr. Lansing misses the whole point of the problem in suggesting that the extension of one or other sovereignty to Spitsbergen is for any other purpose than to facilitate and control its commercial development. The problem is not an abstraction for the student of political science to amuse himself with, but a practical issue fraught with important economic consequences.

Whether such a form of international government would work in the long run is somewhat doubtful. No exactly parallel cases exist for comparison. No doubt in practice Spitsbergen under this system would be virtually a Norwegian possession, without any guarantee that British interests would receive fair treatment. At any rate the scheme was doomed, for opposition arose in an unexpected quarter. This time Russia was prepared to acquiesce, but Germany obstructed. German commercial interests in Spitsbergen did not exist, and the cold shoulder that Lerner got five years previously did not suggest that Germany had any interest in the far north. Possibly, however, there were other reasons which, at the time, few people divined and none assessed rightly. These are discussed in another chapter.

The German delegate at the conference was clearly

aiming at a seat for Germany on the commission, and this aroused Russian opposition. Sweden and Norway, still a little suspicious of Russia, would no doubt have preferred a large commission, but as Britain refused to take a place on it, and opposed Germany's demand, no solution could be found. This was the state of affairs when war broke out in August, 1914, and put an end to the discussion.

During the war the question of Spitsbergen more than once cropped up. Writers in the Norwegian Press, if they did not actually propose Norwegian sovereignty, have more than once dwelt on Norway's paramount interests. In this country Dr. Bruce and others advocated British sovereignty, both on account of her historic claim, her great economic interests, and for strategic reasons. Swedish writers, not to be behindhand, scoffed at British claims and boasted of their own. America definitely abandoned what interest she had. Russia was too busy with her own troubles to pay any attention to Spitsbergen. Then the whole argument was quickened, and feeling ran high in Norway owing to a mistake of the press.

Late in September, 1918, it was freely reported that Britain had annexed Spitsbergen. This story arose out of the annexation by a British mining company of the German claims in Cross Bay, but there was not a vestige of truth in the story of British claim to the whole archipelago. Yet the report was never denied, except, about a month later, in answer to a question in Parliament. Naturally it aroused great excitement in Norway, and no doubt would have led to a protest against such high-handed action

had not Norwegians been too well versed in Spitsbergen affairs to take the report seriously. Norwegian writers then began to advocate the claims of Norway, in some cases with more heat than reason. No one can deny that Norway has strong interests in Spitsbergen, but her claims are not strengthened by the statements that Norway was the pioneer in mining or that Norwegian now exceed British mining interests. Nor is it relevant to the argument of sovereign rights to insist that Spitsbergen was a Norwegian discovery: Svalbard, we have already seen, may very likely have been Spitsbergen, but it can no more be proved than the contention of Dr. A. M. Hansen, in a series of articles in the *Morgenbladet*, in March, 1919, that Norway knew of Spitsbergen long before Svalbard was discovered.

A better spirit was shown by a Christiania newspaper, which has always shown a friendly attitude towards Britain, in insisting that, while Norway and Britain have equal economic interests, it was of importance that Norway should secure the support of Britain at the next conference on the subject: under no circumstances must the settlement be allowed to interfere with the maintenance of Norway's good relations with Britain. Swedish writers, feeling no doubt that Sweden has no claims that can stand beside those of Britain and Norway, had less to say, although the suggestion came from a prominent Stockholm newspaper that British designs should be thwarted by a joint Scandinavian protectorate. In the early spring of 1918, on the rumour gaining ground that Norway was to be given control of Spitsbergen,

the Swedish Press raised a chorus of protest, but discovered no valid argument in favour of Swedish rather than Norwegian sovereignty. Before long the storm may arise again in Scandinavia.

There remains to be noticed recent German diplomatic interest in Spitsbergen. The notorious Brest-Litovsk Treaty of 1918 between Germany and the Russian Soviet Government contained a clause which ran as follows: "The contracting parties will direct their efforts to having the international organization of the Spitsbergen Archipelago, which was contemplated at the Spitsbergen Conference in 1914, carried out on a footing of equality for both parties. To this end the Governments of both parties will request the Norwegian Government to bring about the continuation of the Spitsbergen Conference as soon as possible after the conclusion of a general peace." It has already been stated that Germany had no economic interests in Spitsbergen, either at the outbreak of the war or previously. Her interference in Spitsbergen affairs was as presumptuous as her other claims in the Brest-Litovsk Treaty, and as little worthy of serious consideration.

Certain expressions of opinion which the clause prompted were not without interest, especially the statement in the *Norddeutsche Zeitung* that Germany had no wish to exclude any of the Powers concerned from participation in the organization of Spitsbergen, and that she wanted nothing more than equal rights for all. Germany, that paper declared, championed that standpoint at the Spitsbergen Conference in 1914! Of more value was the remark of another writer that

the Powers in 1914 expressly recognized Spitsbergen as a *terra nullius*, and that therefore the British annexation of 1614 had ceased to have any effect. This in substance was true, and represented the position of Spitsbergen at the opening of the Peace Conference.

XXVII

THE SPITSBERGEN PROBLEM

THE discovery of a land cannot be accepted as a criterion of its ownership, unless it is followed by effective occupation, in which case occupation rather than discovery forms the basis of the claim. Cases of uninhabited lands comparable with Spitsbergen are not easy to find outside polar regions, and even there are rare. Certain Pacific islands have been annexed at one time or another by Britain, France, or the United States, and have not since been occupied, but in these cases the islands were part of a group of which the principal ones were already occupied by the Powers concerned. It was a question of consolidation of interest and protective measures rather than of new territorial footing.

In polar regions discovery has never been synonymous with sovereignty, unless for similar reasons. Canada, and not the United States or Norway, whose subjects discovered some of them, claims all the islands of the Canadian Arctic Archipelago. Russia in 1916 laid formal claim to all the islands lying north of Siberia, including Bennett Island, discovered by an American subject. Austria never claimed Franz Josef Land nor Holland the island of

Jan Mayen. In the Antarctic, Britain has annexed lands discovered by Russian and French explorers. Kerguelen, in the South Indian Ocean, presents a case nearly parallel with that of Spitsbergen. The French base their undisputed claim to it to French discovery in 1772, followed, however, by definite annexation in 1774. This claim is maintained, and not disputed, although British and American whalers first made use of the island.

Even were the contention that discovery gives sovereign rights a sound one, it would be impossible to apply it to Spitsbergen. There is no certainty about the original discovery of the country. Probably it was Norwegian, it may have been Russian, it almost certainly was not Dutch, although Holland revealed it anew to Europe. Russia was at one time inclined to base a claim on prior discovery, but dropped it as untenable. Denmark never used this plea, for the good reason, no doubt, that the Viking discovery was lost sight of until modern times, but of late years some Norwegian writers have urged it as a reason for Norwegian control.

Russia in 1871 claimed paramount interest in Spitsbergen, on the ground of usage from time immemorial. Certainly in the seventeenth and eighteenth centuries Russians made considerable use of the country, and for some years virtually colonized it with hunters and trappers. But if this settlement of Spitsbergen constituted a claim to sovereignty what shall be said of the British and Dutch, not to mention Danish use of the country in the whaling days over a century before? True, it was mainly a summer

occupation, but was more intensive while it lasted. In want of proof of earlier Russian occupation no claim can be based on the Russian hunting of the seventeenth century. Still less attention need be paid to Denmark's claim of the seventeenth century, based on Spitsbergen being part of Greenland, or on her vague claim to the sovereignty of the Northern Seas.

Claims with more validity are those based on annexation. Two Powers have annexed Spitsbergen, the Dutch in 1596 and the British in 1614. The priority of the Dutch claim would suggest that the British claim was invalid, but the Dutch, from the day their claim was over-ridden, seem never to have made any formal protest. Opinion ran high against the English when Marmaduke tore down the Dutch claim-posts in 1612, but the Government of the States General took no action. Moreover, in those days, Spitsbergen was supposed to be part of Greenland, a Danish possession. In this case was the Dutch claim valid? In a previous chapter it has been shown how the Dutch interest in Spitsbergen all along was purely commercial, and had no territorial aims. Since the Dutch whalers ceased to visit Spitsbergen, Holland has never shown the slightest desire to revive her claim.

The English claim, in want of Dutch opposition, stood valid. It was disputed ineffectively by the Danes, but with no real case behind them their counter-claim was weakly asserted. The English claim has never been abrogated, but when the whaling ceased, early in the eighteenth century, Spits-

bergen had little interest to Britain and her claim was forgotten. It has been suggested by writers in this country that the claim of 1614 should be revived, and that Britain should maintain her sovereign right to Spitsbergen. Politically such an act might be expedient, and legally, no doubt, it could be argued to be admissible, but morally our right could well be questioned. For about two hundred and fifty years Britain has given no sign that she considered Spitsbergen her property. There is probably not a single map in existence that shows it as a British possession, nor a single document of modern times that claims it as part of the British Empire. Since our claim was made and allowed to lapse new interests have arisen in which other countries have a share. To revive our ancient and forgotten claim in face of these new problems would be a high-handed and questionable way of settling the Spitsbergen problem. In any case it is not a method that is likely to be pursued. Britain's adherence to the Christiania Conference of 1914 was a definite recognition of the status of Spitsbergen as a *terra nullius*, and a final repudiation of any suggestion that she still claimed sovereign rights. Her attitude since that abortive conference has been consistent with that position. In 1918 the Foreign Office stated that Britain still recognized Spitsbergen as a *terra nullius*. This was an answer to the statement that appeared in the press in autumn of that year at the instance of a mining company that Britain had definitely annexed Spitsbergen.

The settlement of the sovereignty of Spitsbergen

starts afresh from 1914, for Norway, Sweden, and Russia, no less than Great Britain, accepted in that year the principle of a *terra nullius* as the basis of discussion. Consequently, arguments based on previous claims and annexations are irrelevant to the problem as it is to-day.

To the old school of diplomats, bound by tradition and wedded to precedent, the Spitsbergen problem is regarded as a nuisance: for many years it has been shelved in the hope that it would solve itself. But so far from doing that it has become acuter and more complex. Decision can no longer be deferred. Three possible ways of settling the political status of Spitsbergen have been suggested:—

1. The partition of Spitsbergen. 2. International control by two or more nations. 3. Annexation by one or other nation.

Although it is possible that before these pages appear in print the problem will have been solved, it may not be unprofitable to examine the complexities of the situation.

(1.) Three nations—Britain, Norway, and Sweden—have at present considerable commercial interests in Spitsbergen. The only other interests are Russian, and they are very small. More than half the country is still unclaimed, and large parts of it will probably always remain in that state. The unclaimed parts could be divided among the three nations interested in proportion to their existing claims. But this would present many difficulties. Some parts are probably devoid of minerals, others are difficult of access, and so of little value. The country would

require to be adequately prospected—the work of years—before any equitable division could be reached. The distribution of existing claims, moreover, would tend to make partition unworkable. In Lowe Sound, British and Swedish estates are closely interwoven: the Swedes have no access to Braganza Bay except through British territory. Icefjord would present a microcosm of north-western Europe with Russian, Norwegian, British, and Swedish areas of control, and possibly others, on still unclaimed land. Partition would entail a multiplicity of officials, a confusion of regulations, and scope for much chicanery. Instead of solving the Spitsbergen problem, it would increase its complexity.

(2.) The various Spitsbergen conferences have had in view some sort of international control. That, at any rate, has been their nominal aim, for as far as Norway is concerned she always hoped to be the predominant partner in any arrangement. This involved Swedish opposition, and both used to arouse Russia to protest. But there are indications that the establishment of international control would present less difficulty in arrangement than it formerly did. Britain, Norway, and Sweden would be the only countries to be considered. The difficulty lies not in establishing but in maintaining such a system of government. Either the system becomes ineffective as a means of government or it results in control resting with the more energetic or the more designing partner. The Belgian Congo was originally designed as a Free State, nominally under international control. It very soon became the personal domain

of its king, Leopold of the Belgians. The New Hebrides for many years have been a joint condominium of France and Britain, administered by French, British, and neutral officials. The system is condemned by those who have had experience of its working. The experiment of joint control in Samoa had to be abandoned. In short, however fair and equitable international administration may seem in theory, it proves in practice to be beset with so many pitfalls that it is the last system which should be adopted. In the case of Spitsbergen it could at best be only a temporary expedient, adopted to tide over present difficulties and delay the real settlement. It is to be hoped that the European States will not shirk the problem that faces them by resorting to this spurious solution.

(3.) If Spitsbergen is to be annexed by any one State it is again a matter of three countries only. The decision must lie between Britain, Norway, and Sweden. We have already shown that at the beginning of the mining era no country had any real claim on Spitsbergen. In the absence of a native population, claims to sovereignty must then be based on modern use and occupation and strategic position. British subjects were the first to tap the mineral wealth of Spitsbergen, and now hold between them larger estates than the subjects of all other countries put together. Nearly four thousand square miles, the total area of British holdings, is about one-seventh of the total area of the country. It includes rich mineral fields, on which a great deal of capital has been expended even if there

is comparatively little to show so far in export of minerals.

Norwegian holdings are much smaller in area—about one thousand square miles—but some of them, thanks to previous American enterprise, are the best developed estates in Spitsbergen, and have been exporting coal for several years. The capital sunk on the estates now held by Norwegians is probably not much less than that invested in the British estates, but the proportion due to Norwegian enterprise is small, though far from inconsiderable. The Norwegian State has contributed largely to the exploration of Spitsbergen from 1909 onwards, has spent a large sum in erecting and maintaining a high-power wireless station, and for some years has subsidized a summer mail service. These aspects of Norwegian activity must not be overlooked in assessing Norway's claim to sovereignty. The motive in this activity was, no doubt, to increase Norway's stake in the country, and it has done so beyond any doubt. Again, it must be admitted that the majority of the population are Norwegians. This estimate excludes the hunters, on whose Norwegian nationality Norway bases one of her claims. The hunters, however, are the least desirable element of the population, and have done more harm than good to Spitsbergen and to Norway's claim.

Swedish holdings are smaller and less important than Norwegian ones, but are of some value as regards coal, and one at least is well developed. Their total area is about eight hundred square miles. Swedish explorers have done much scientific work, especially in

geology, and have laid the foundations of the knowledge which attracted miners to Spitsbergen. The Swedish State in the past contributed freely to several expeditions, and is said to have offered assistance to recent prospecting expeditions. But Swedish capital sunk in Spitsbergen is less than Norwegian or British. A large proportion of the shares of the chief Swedish mining company is held in this country. The Swedish State, like our own, has no property in Spitsbergen, with the exception of two houses, one in Mossel Bay and one in Treurenberg Bay, erected for scientific expeditions in 1872 and 1899 respectively.

It must be admitted then that the strongest claims to sovereignty are those of Britain and Norway. Moreover, both these countries are in direct sea connection with Spitsbergen, a consideration of some importance in the work of administration. Between the weights of these two claims there is little to choose. Position, propinquity, and national sentiment turn the scale in Norway's favour, but these are counterbalanced by the extent of British mining claims.

Considerations of a strategic nature must not be overlooked. Trade round the North Cape promises to increase in the future. The Arkhangel Railway is now enlarged to standard gauge, and may shortly be double-tracked; the port of Arkhangel has grown immensely during the war, and has been saved from Bolshevik destruction by Allied intervention. The Murman Railway is a new route to the heart of Russia. Finland hopes for an Arctic port, with a railway to

the south. Attention is being paid to the improvement of Russia's wonderful system of natural waterways, which will facilitate trade with the mining districts of the Urals and the rich corn lands of Siberia. The Pechora River, hitherto of little importance, is now the site of timber and oil concessions. Lastly, the old sea route to the Siberian rivers, the Ob and Yenisei, virtually abandoned in the seventeenth century, is again coming into favour. The Kara Sea is losing some of its dangerous reputation, which was never fully merited, and the value of the Ob and Yenisei as Siberian trade routes is being realized.

The distance from Norway to Spitsbergen is only 370 miles : to Bear Island only 220 miles. It is clear that Spitsbergen in the hands of a hostile power, or of a power unable to defend its neutrality might become a base for raiders on the commerce round the North Cape. Such a base, well supplied with coal, oil, and iron, and provided with deep-water harbours, might well become a nest of submarine pirates. The possibilities of Spitsbergen for this purpose were not ignored in Germany. As long ago as 1901 a project of a submarine voyage from Spitsbergen was mooted in Germany. In all probability this had no other aim than exploration, but the suggestion contains the possibility of more sinister designs. Even if the submarine is abolished by international agreement, Spitsbergen might still serve as a base for swift and deadly attack. There are several suitable sites for aerodromes : probably the Foreland Laichs, some thirty square miles in area, is the best. From there

attacks would be possible on north-western Europe, and on shipping in the North Sea and North Atlantic. Again, it was Germany that foresaw these possibilities, and, by the investigation by her scientists of meteorological conditions in Spitsbergen, discovered their suitability for flying purposes.

At present it is impossible to forecast the conditions that will obtain in Europe after the peace settlement. It may be that peace will be so securely founded that strategic considerations will have small weight. In that case the government of Spitsbergen will be easier to decide on. The effacement of Russia as a competing claimant, and the absence of a dictatorial Germany at the conference table, will facilitate matters. In an atmosphere of drastic proposals and far-reaching changes the problem should not prove insoluble.

Perhaps the most satisfactory plan would be for the League of Nations to give one nation a mandate to administer the country under laws and regulations to be determined by the League. One stipulation only must be insisted on. Due recognition must be paid to pre-existing rights and privileges. It would be most unfair that estates acquired and developed in a no-man's land should be prejudicially affected by the new form of government. British pioneers must not be left in the lurch. If the mandate falls to Norway, as is not impossible, the promise of the Foreign Office that British claims will be safeguarded must be literally kept, by those claims being excluded from regulations which are unfavourable to their free development. They must have preferential treat-

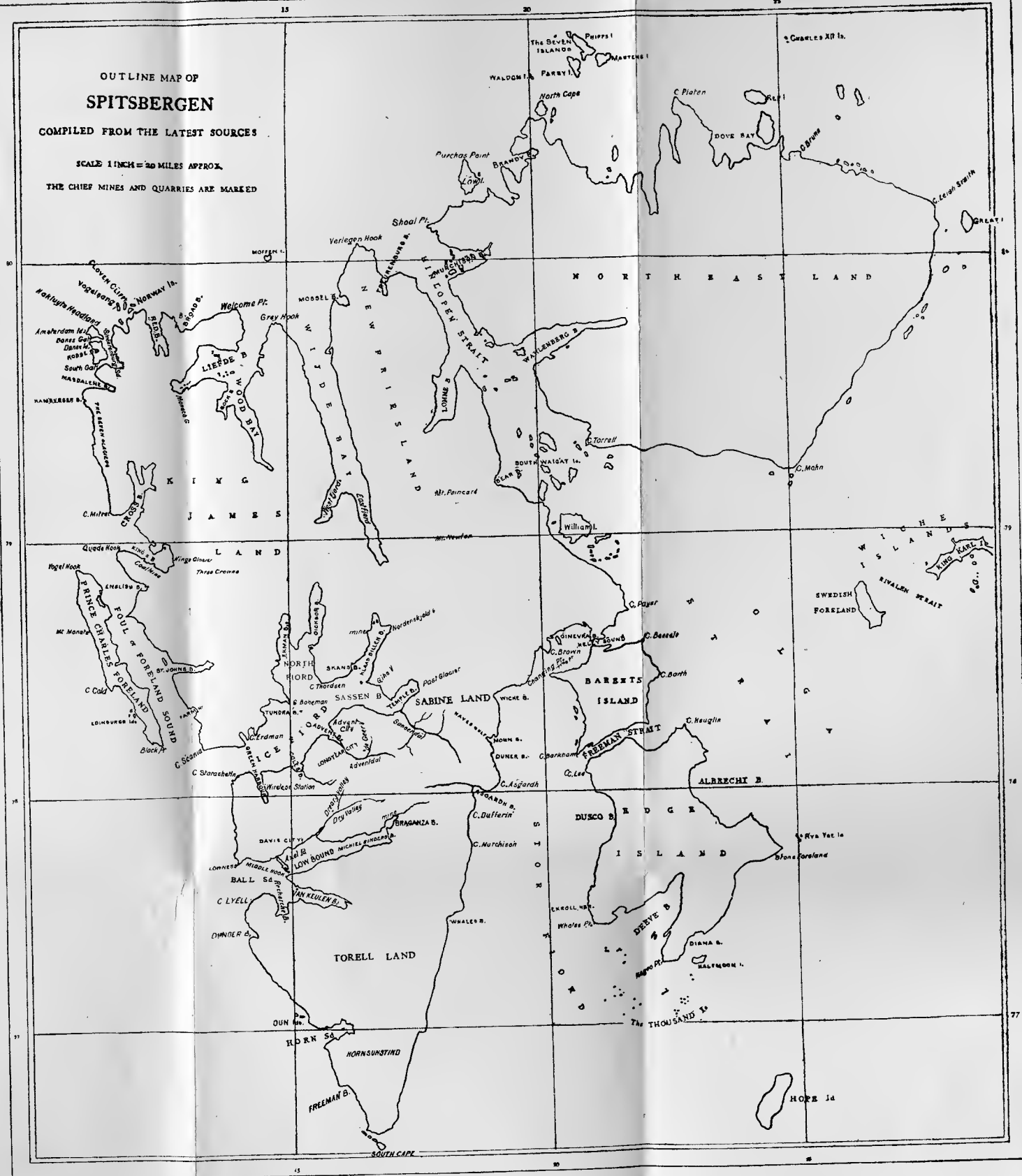
ment, compared with any estates claimed subsequent to the date of settlement. If the mandate should fall to Great Britain, Norwegian owners in Spitsbergen would be justified in demanding comparable safeguards.

OUTLINE MAP OF
SPITSBERGEN

COMPILED FROM THE LATEST SOURCES

SCALE 1 INCH = 20 MILES APPROX.

THE CHIEF MINES AND QUARRIES ARE MARKED



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